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Radio Sets Put on Production Basis

Method of Assembling and Testing Radio Units at the Crosley Plant Has Resulted in Manufacturing Economies

BY J. B. NEALEY*

THE design and manufacture of radio receiving sets have been forced to go through the various stages of development that are encountered in perfecting any mechanism. With the modern production methods of the automotive and other industries as a guide, however, the manufacture of this comparatively new product has been brought to a high degree of efficiency in an unusually short space of time, despite the intricacy and "trickiness" of a complex mechanism reproducing ephemeral tone qualities.

The Crosley Radio Corporation, Cincinnati, is putting out a line of radio receiving sets for which there has been such a great demand that the company operates in mass production. One of the biggest factors contributing to its success is its method of assembling and testing radio units, the entire process of manufacture being as near straight-line mechanical progression as possible.

The concern has three plants in Cincinnati. Assembly, testing and some manufacture are carried on in plant No. 1, which is six stories high. Production schedules, ranging from 1000 to 5000 sets, are made out a week in advance.

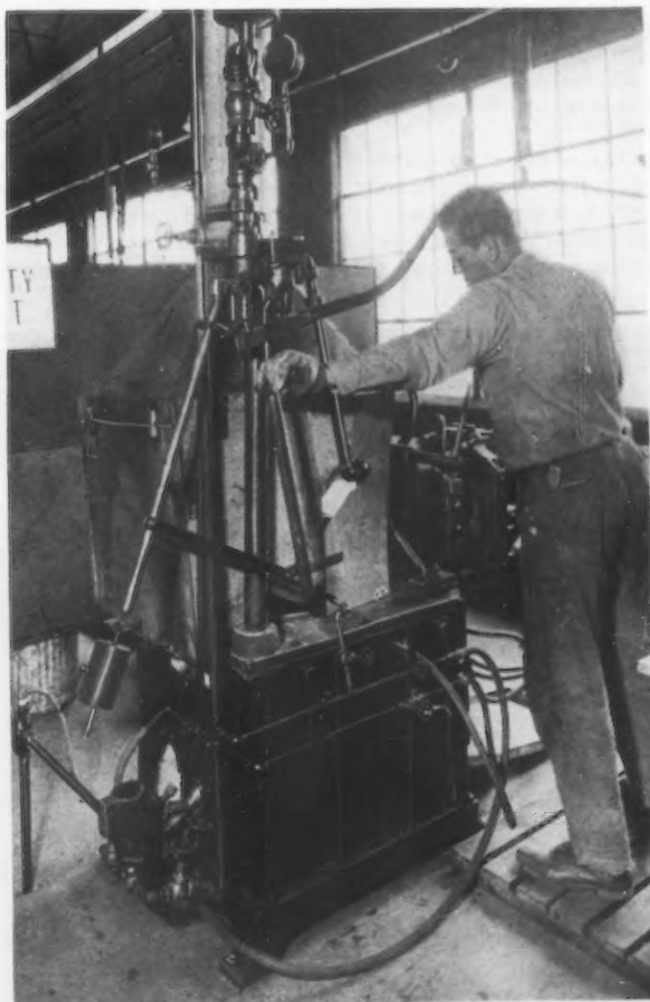
*American Gas Association.

Requisitions for parts and for sub-assemblies, in sufficient volume to fit the schedule, are then made to the foremen of the various departments and distribution is timed to meet their various requirements.

Condensers are manufactured and assembled on the top floor, starting with the die casting of the stator and rotor blades into groups, after which the fins are trimmed from the die cast pillars and holes are tapped. A long line of presses and tapping machines are provided for this purpose.

Blade assembly sets are washed in a continuous, automatic gas-fired washing machine built of sheet metal. Work is sent through in pans with screen bottoms on a slat-type conveyor. Steam and water coils and jets for spraying are located in the first part of the machine, while the second part is for drying and is equipped with nine gas burners, equally spaced. There is a loading and unloading platform at opposite ends of the machine, the capacity of which is close to 10,000 sets of blade assemblies daily. It is 12 ft. long, 3 ft. wide and 4½ ft. high. The final operation is pressing in the rotor shafts.

The die casting department contains 10 die



POT of Die Casting Machine Is Heated by Single Gas Burner Which Will Melt Cold Charge in 30 Min. Automatic temperature control is provided



PARTS Are Cleaned and Dried in Automatic Cleaning Machine Equipped with Continuous Conveyor. Hot solution tank, hot water rinse tank and drying portion of machine are heated by gas. Machine can handle 30,000 parts daily

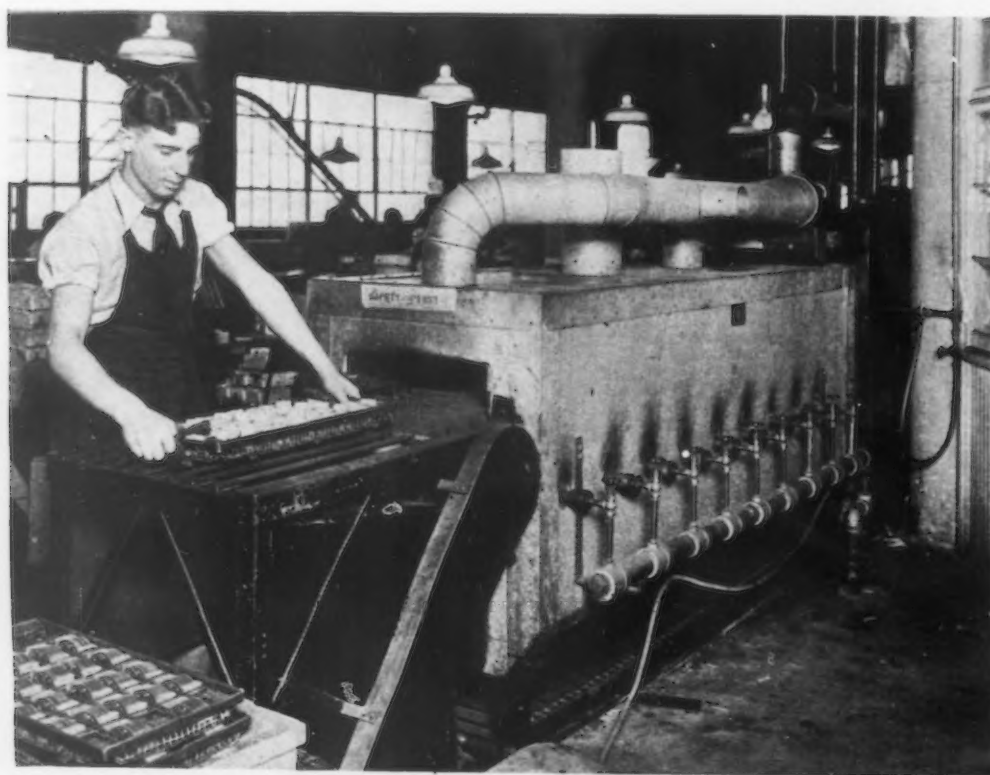
casting machines, and the metal, which is a zinc-copper-aluminum alloy, is melted with gas. The pots are 18 x 24 in. and are 15 in. deep, being heated by a single gas burner which will melt a cold charge in 30 min. An obsolete burner, formerly employed, required 2 $\frac{3}{4}$ hr. to do the same work. Pots are equipped with automatic temperature controls so that attention on the part of the operator is not required for this purpose.

A goose neck sets down in the molten metal and the dies are held together in a machine just above and in front of the pot. The blades are set in a jig and placed in dies, which are closed under pressure. The goose neck is filled with metal, one end is elevated until the nozzle fits

into an opening at the base of the dies and compressed air is used to force the metal into the dies, the molten metal chilling and setting the instant it comes into contact with the cold metal of the die.

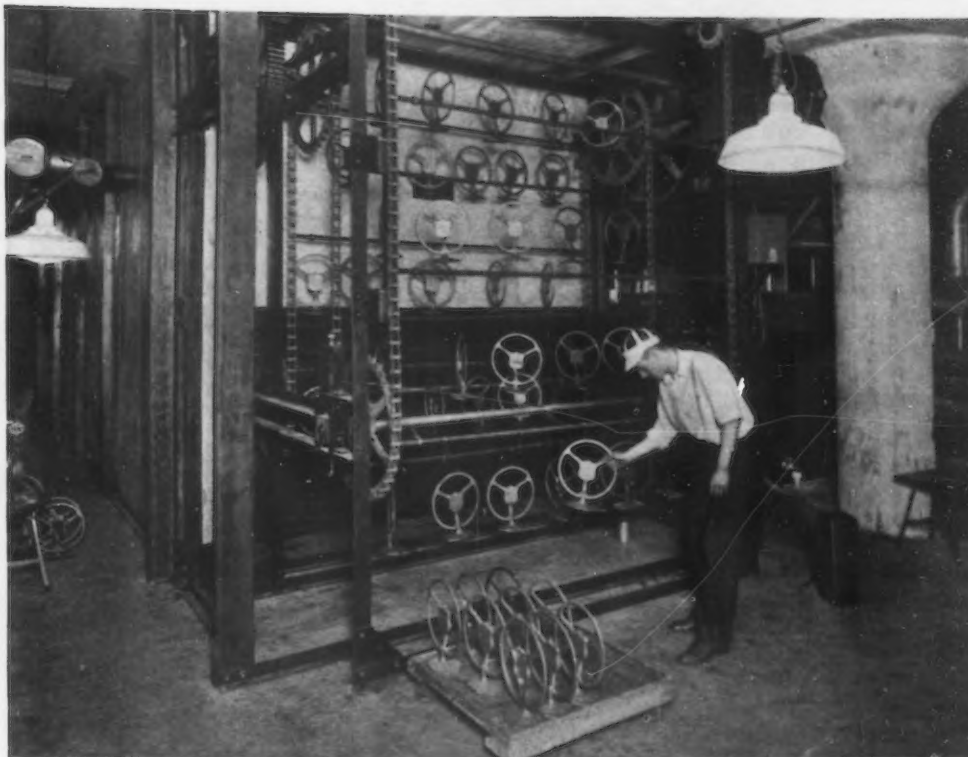
Condensers are assembled on two tables about 200 ft. long and 3 ft. wide. Down the center of the tables runs a traveling belt conveyor. Parts are distributed to various stations along the tables, having been sent up from storage below by elevator. The condenser frame, a steel stamping with two partitions, is started down the line, the stators and rotors being put in and other parts affixed as it travels along.

As the three tuning or radio frequency coils and the



BLADE Assembly Sets Are Washed in Continuous Automatic Washing Machine. Work is sent through in pans with screen bottoms on a slat-type conveyor

AFTER Being Japanned, Parts Pass Through Gas-Fired Automatic Oven with Continuous Conveyor Consisting of Two Long Endless Chains Connected by Rods. Conveyor makes five vertical passes during journey through oven



three variable condensers must have identical electro characteristics (resistance, capacity and uniformity throughout a broadcast range), the condenser is tested and proper adjustments are made on the assembly line. These characteristics are then checked by another tester equipped with the proper appliances. The cover is put on and the finished condenser is hooked on to an overhead chain conveyor, which takes it to the receiving unit assembly department on the floor below.

Here units are assembled on 14 long tables, each about 75 ft. in length, running transversely across the room. The operations are as follows:

1. Tube sockets riveted into bottom panel.
2. Fixed condenser put on.

3. Transformer and wires put on.
4. Antennæ choke and connector strip.
5. Balance condensers.
6. Wires fastened to terminals.
7. Radio frequency coils and metal shields.
8. Tested for loose connections and matching of radio frequency coils.
9. Parts wired together.
10. Variable condenser attached. Here, the overhead conveyor from the floor above, carrying the condensers, crosses the table and the operator at this station on the line reaches up and takes them off as they come.
11. Other small parts put on.

A complicated testing mechanism, developed by the company, is located at the end of the line, where the set is

ASSEMBLY Work Is Done by Operators at Long Bench. Overhead chain conveyor is used to carry parts from one operation to next



tested for loose connections. The set is placed in a frame with 32 electrical points which match and contact perfectly the 32 points of the set. These are wired to a 32-point switch. There are seven jacks with four points each and seven more that fit in the tube holders. A panel contains numerous small lights, a millimeter, voltmeter and galvanometer. An accurate check is made of all connections in the set by rotating the switch and operating the jacks.

The finished receiving unit is then put on a conveyor, which takes it to the floor below, where the converters for the a.c. current are assembled. Here are located the same number of cross tables or assembly lines as on the floor above. The assembly starts with the frame, which is a steel stamping, and to it are added the transformer,

apparatus already developed, it is possible to measure with extreme closeness the sensitivity, selectivity, tone quality and amplification of any radio set in a few minutes. These tests are always made under the same conditions and may be repeated any number of times with the same results.

A signal is made especially for the test and its frequency may be adjusted to any value within the broadcasting range. The strength of the signal can be easily controlled within wide limits. Outside conditions, such as weather, static, etc., are excluded and are factors that do not affect this test. The overall performance of the set can be checked, or, if desired, any part such as the radio-frequency or audio-frequency may be tested separately. In this way it is possible to study a new set throughout



ONE of Assembly Lines with 40 Operators. Inspectors and testers are in foreground

chokes, condensers, resistance and other small parts as it moves down the line.

Converters Added to Receiving Unit

The overhead conveyor, with completed receiving units from the floor above, crosses the assembly lines at the proper point and the operators remove them and attach the converter. This forms the radio set of commerce. Here the entire set is tested for continuity, that is, to show that all circuits are complete and that the proper voltages are supplied to the various tube filaments and plates. The set is lifted up to the chain conveyor from the ends of the assembly tables and carried to the floor below, where the principal testing is done.

As quiet and complete freedom from electrical disturbances are necessary, testers are placed in sheet steel booths, of which there are a large number, arranged in rows. A traveling belt conveyor runs the length of each row, small windows being provided in each booth for it to pass through. There are four testers in each booth, who remove sets as they pass through and replace them on the belt when they have been tested.

Much money and time have been spent in the Crosley laboratories in designing a testing unit by the aid of which radio design could be put on an exact basis. With the

all of its stages of development, detect any inferior part and redesign it. Furthermore, competing sets on the market can be measured with a common yardstick and their performances compared.

Cabinets, made of steel stampings, are received, washed, dried, japanned and baked on the second floor. The cleaning machine is automatic and has a continuous conveyor. It is of steel construction and is 52 ft. long, 4 ft. wide and 5 ft. high. The conveyor consists of two long chains of 6-in. links, with small wheels at short intervals riding on tracks at each side of the machine. A wide wire screen is suspended between the chains and cabinets are carried through on the conveyor, which is driven by a motor through variable-speed gears.

The first half of the machine is equipped with tanks and pumps below the conveyor and with coils and sprays above. In the first tank is a hot cleaning solution, which is pumped up into the coils and forced down on to the cabinets in jets. From this point it falls back into the tank for reuse. The next operation is similar, only a hot water rinse is used, followed by a cold water rinse, after which steam is forced on to the cabinets. Cold compressed air is then used to blow off some of the moisture as the work proceeds into the second half of the machine, which consists of the dryer.

The drying portion is equipped with four gas burners, two located in the front end and two in the discharge end. An automatic control, attached to each group, maintains constantly the correct heat in the dryer. The hot solution tank and the hot water rinse tank are heated with gas burners which are also automatically controlled to maintain the liquids at the correct temperature. This machine will wash and dry 30,000 or more parts daily, seven minutes being required for each part to travel through the machine.

Cabinet sections are then sprayed with japan in a long line of spray booths and sent through a gas-fired, automatic bake oven. This oven is 30 ft. long, 10 ft. wide and 9 ft. high and is provided with a continuous conveyor. The oven proper is constructed of sheet steel. The con-

veyor, consisting of two long endless chains connected by transverse rods, makes five vertical passes in the oven during the course of its travel.

Heat is supplied through eight long gas-pipe burners equipped with two automatic temperature controls with recording pyrometers. These maintain a temperature of 160 deg. Fahr. in the first part of the oven and 350 deg. in the second. The baking period, which is controlled by the speed of the motor-driven conveyor, is 45 min. A cabinet consists of three pieces and 9000 pieces can be japanned and baked in this oven daily. Other finishes require different temperatures and baking periods.

Following the spraying and drying operations, sets are placed in cabinets and the complete units are sent to the shipping department.

Promise of Steel Plate Floor for All Sorts of Buildings

THE new floor construction, known as the battledeck type, was announced and given its first public demonstration at the seventh annual convention of the American Institute of Steel Construction, Inc., at Biloxi, Miss., Nov. 14, as mentioned in THE IRON AGE of Nov. 21, page 1379. A special General Electric automatic arc welding machine there illustrated stitched the plates and beams together to form the flooring.

The new floor is described by the institute of steel construction as being a solid steel deck which acts as a girder to prevent any torsional distortion of the building when subjected to wind or earthquake action. It enables the engineer to select that part of the structure which is to carry the wind stresses to the foundations, and to be assured that the deck flooring will deliver the stresses to the most rigid part of the vertical frame. The floor construction can be carried out into the walls to provide standard construction to support the outside walls. It will provide a working floor for other trades and in many places eliminate the necessity of temporary planked floors.

The total cost of a floor constructed of 3-in. I-beams and 3/16-in. plates, covered on the top with cork tile and fireproofed on the under side, is estimated by the institute as being a little over \$1 per sq. ft. It is pointed out, however, in this connection, that the cork tile floor eliminates the necessity of any other floor covering, which is always a part of a tenant's expense when using an ordinary masonry floor. The cost of a good chenille carpet alone is from \$1.25 to \$1.50 per sq. ft., and the welded battledeck floor complete will cost less than the carpet and eliminates its necessity.

The welding machine consists of a three-wheeled self-propelled vehicle driven by an adjustable-speed motor. On the framework are mounted a wire feeding device, a reel of welding wire, the travel motor and the control devices, all occupying a space of less than 5 sq. ft. and having a height of 2 ft. A motor generator at a remote point supplies, through a trailing cable, the current for welding and for operating the travel motor. The speed of travel and the speed of the welding wire feed can be varied by adjusting small rheostats. In the demonstration at Biloxi a satisfactory weld was accomplished at a speed of 9½ in. per min.

In operation the machine is placed on the beginning of a seam where it is lined up and started running. If by any chance it should tend to deviate from the seam during the course of travel, it can be easily steered by means of a small steering wheel on the mechanism. At the end of the seam it is merely necessary to turn the machine around and place it on the beginning of the next seam, proceeding from this point as before until all seams are welded.

The new steel floor, says the institute, is equally applicable to residences, multiple-story buildings and bridges, and for building construction it will save from 20 to 60 lb. per sq. ft. of floor in dead weight. In connection with a 75-story building with floor panels 21½ x 22½ ft., the saving in dead load on the foundations for each column is nearly two million pounds, and indicates that its use will permit an increase of 25 per cent or more in the height of the building or in the number of floors without increasing the loads on the foundations.

Handling Equipment Increases Unit Loads and Lowers Rehandling

Every successful installation of material-handling machinery is successful because it does one of two things. It either eliminates rehandling operations or it permits the handling of more material each trip. Discussing these factors before an engineering meeting in Akron, E. T. Bennington, Cleveland Electric Tramrail, Wickliffe, Ohio, said that many have a great deal of faith in what can be accomplished through the use of these two fundamental principles as applied to overhead conveying. But the large majority of engineers have not yet come to realize the real advantages through proper use of these principles of overhead conveying machinery.

The savings and advantages do not lie alone in reducing the cost of the payroll for the men actually engaged in moving materials. The application of these principles has usually a far-reaching effect. It has been known to affect the operating costs in every department in some of the largest plants in the country.

Capacity Quadrupled

As an example of elementary rehandling operations may be considered the handling of coils of wire in a large steel mill. A hairpin hook on a tramrail system lifts 3300 lb. of rod, made up of 11 bundles weighing 300 lb. each. Before the installation of the tramrail system 20 men were employed in handling this wire rod as it came off the mill. It was rehandled many times before it entered the manufacturing department or was placed on cars.

A conception of the relative capacity of hand labor aided by trucks, and the hairpin hook unit on the tramrail system, can be obtained by considering that the capacity of 20 men and a few trucks was 200 tons loaded into cars per day. Now, one unit is capable of loading 900 tons per day, if the wire mill could produce this amount of material.



Cast Aluminum Alloy That Compares With Die Castings

EVERYONE conversant with the foundry industry is familiar with the accurate molding required in the manufacture of special iron castings, such as those that have been used in typewriter and cash register assemblies, where a minimum machine finish was required. Stove plate molding, also, has always demanded a high grade of work to produce the neat fits without machining so characteristic of those well-built articles. Likewise, a vast quantity of exact castings have been made of tin bronze in various compositions.

But, today, when light metal castings of precise dimensions are contemplated, one naturally thinks of die castings, their composition and the accurate equipment necessary to their production. In like manner, when manufacturing aluminum alloy sand castings with tolerances approaching die castings, the essential demands are composition and adequate equipment. The composition involved in this particular case can be disposed of in a few words as it consists of an alloy containing 95 per cent aluminum and 5 per cent silicon, designated as Navy Department Specifications 46 A 1 a, Class 2. This combination casts readily and produces sound castings free from checks and other molding troubles.

Metal and Wooden Patterns Used

Patterns must be so constructed that their original dimensions may be preserved. This is accomplished by the use of metal patterns where large quantities of castings are required; but the majority of patterns are made of hard wood, and in this case saw cuts are at times made in thin sections to allow expansion and contraction of members of pattern assembly without affecting the controlling dimensions. Different shrinkage (contraction) rules are used on the same pattern to cover varying conditions; and

Made in Sand and Requires Minimum Machining— Unusual Practice at United States Naval Gun Factory

BY LEWIS H. FAWCETT*

constructed of wood and rest on a level floor paved with wooden blocks. The bench top consists of a cast iron plate which has been machined to obtain a plane surface. All core plates are of iron, machined on face and supporting ribs. Rectangular blocks of cast iron machined all over are used as guides in removing core boxes from the cores, and where possible the boxes are constructed to part, so as to obviate the "rolling over" of the core.

Machine finish on equipment of this kind may seem extravagant but these shop tools have been in use for more than ten years and have fully justified their original cost. Pressed steel flasks for small jobs and substantial wooden flasks for large work are used in molding to prevent springing, and great care is taken to secure accuracy in flask pin alinement. Straight line railroad tracks leading into the core ovens pass between the core benches and the molding floor. Low flat cars, the width of the core ovens, run on these tracks. The floor or top of the car consists of a machine finished cast iron plate.

The more machining performed on the equipment the less machining required on the product. These true flat

top cars permit full loading and movement into the ovens without vibration to cores. At night the cars are shoved into oil-fired insulated ovens and heated gradually to from 450 to 500 deg. Fahr. in about two hours time, this temperature being maintained for an additional two hours. The heat is then cut off. As the ovens are well insulated to prevent loss of heat, their temperature will have fallen only to from 350 to 400 deg. Fahr. on the following morning when



FIG. 1—Pattern and Drag of Chute Casting. To the right is the drag before the cores are set. Cores are shown to the left. In the background is the pattern on the left with the follow board at the right

*Metallurgical and Testing Division, United States Naval Gun Factory, Washington.

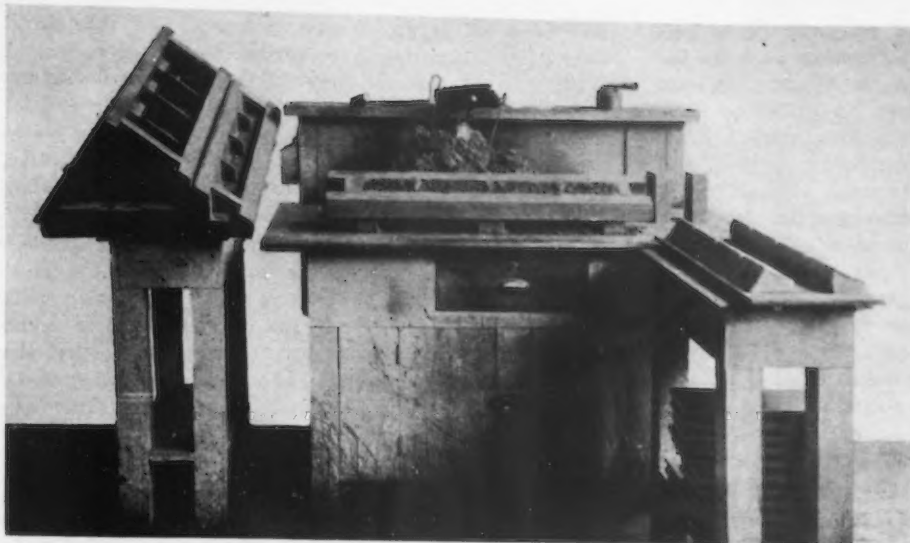


FIG. 2—The Core Bench and the Two Auxiliary Tables Have Machine Cast Iron Tops. On one is the core plate with two cores thereon and in the center a core box is being used to make a core. The foundry floor is composed of wooden blocks

the cars are removed. Having mentioned some of the precautions taken in the interest of accuracy, regarding the equipment, some idea of the molding practice will now be attempted by an outline of this procedure as applied to one comparatively simple job.

Molding of a Chute Casting, Typical Case

The casting to be described is the top member of a rectangular fabricated chute. This assembly is composed mainly of rolled sheet duralumin, 3/16 in. thick, its ends and top are designed as silicon-aluminum alloy castings which are bolted to these sheets.

Pattern, and the drag section of flask, are placed upon the follow board, the follow board being so designed as to fully support pattern during ramming. Facing sand is riddled on the pattern and carefully tucked around it; the drag is then shoveled full of heap sand and rammed up. The surplus sand is leveled off with a strike and the bottom board rubbed to a firm fit. Drag is then rolled over and the follow board removed. Parting compound is sprinkled over impressions made by follow board. The cope, which is barred to the approximate shape of the follow board, is set in place on the drag, filled with sand and rammed up.

Two wedge-shaped gates, three round risers, and an appropriate number of gaggers to support the sand when cope is lifted are utilized in molding the cope. Large vents, to permit easy escape of air, are made on each corner of the mold, at the highest points, and the usual amount of vents is also made over the entire surface of cope. Cope is then taken off; the pattern is removed from the drag and cope and drag-finished in a workmanlike manner.

The molding is done in green sand using No. 0 Albany sand which is mixed, 1/2 new sand and 1/2 used sand, for the facing material. Facing sand is riddled through a No. 6 sieve and the heap sand through a No. 4 sieve. Proper tempering of sand is important, best results being obtained when the sand is worked as dry as practicable, moisture content not exceeding 6 per cent. A high-grade dry Ceylon graphite is applied to the cope, no blacking is used on the sand in the drag. Chills are used and their use is recommended where practical in lieu of risers, in order not to cause excessive restriction of contraction. The flask used on this job is made of wood 2 3/4 in. thick

38 x 42 1/2 in. inside, cope 9 in. deep and drag 14 in.

Foreground of Fig. 1 shows the drag, to the right, before the cores are set in place. The cores are shown on the left. In the background the pattern is on the left and the follow board on the right of picture. Ten copper chills are used in the drag, one under each of the six lugs, and four on the edge to the right of central portion of drag. These chills are painted with wet blacking. Note the nails used to chill the metal along the grooves in the sand which form ribs in the casting.

Two steel strips placed diagonally in the sand on the bottom of right bank of the central impression for the large core are not chills but bearings for the large central core. One of these bearings is barely visible, the other is on the same side or bank but does not show in the picture. A hole about 1 1/2 in. in diameter is made through the sand in the bottom central portion of the drag to vent the large core. This venting is accomplished by a similar hole in the bottom of the core, leading to the interior of core which is filled with broken coke; and a 1-in. diameter hole in the bottom board. Attention is also directed to the three lifting hooks in the large central core. The other two cores have similar hooks.

The three cores used in molding this casting are



FIG. 3—In the Foreground Is a Mold Ready to Close. The pattern is in place on the follow board in the background. The cope at the right shows the position of the three risers.

made in wooden core boxes which are designed to part in order to obviate the necessity of rolling over, as the cores are purposely of very fragile construction and while green are only strong enough to withstand careful handling. Interior of cores is filled with crushed coke and rodded as lightly as practicable; in this case no rod over $\frac{1}{4}$ in. in diameter is used. These fragile cores facilitate contraction by crumbling under the pressure of the contracting metal, thus avoiding cracks and checks in the casting. Their porosity also serves as a means of venting by allowing gas and air to escape through their interior and pass off through the vent in bottom of core.

Core sand, which forms the exterior of the core, consists of 35 parts of straight silica sand, 10 parts No. 0 Albany sand, and one part oil, by volume; a good linseed oil substitute being utilized for this purpose. This combination, prior to the addition of the oil, is passed through a No. 10 sieve. After adding the oil, the core sand is carefully tempered with water and mixed thoroughly in a mechanical paddle mixer. While resting on a cast iron core plate the core box is removed from the core, thus allowing the core to be transferred to the core ovens on this plate. When removed from the oven, the

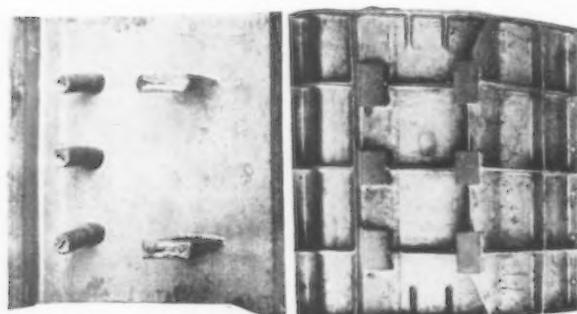


FIG. 4—The Finished Casting at the Left Shows the Heads and Gates. At the right is the other side of the casting after machining and ready for assembling

cores are painted while warm with wet blacking. The heat of the core quickly dries the blacking and the core is then ready to set or be placed in the mold.

In some mold assemblies chills are inserted in the cores to obviate the use of shrink heads; and, at times, where feasible, core assemblies are made in order to eliminate fins on the castings. These methods, however, do not apply to the particular casting being described now.

Closing the Mold and Pouring

After the cores are set in place in the drag, the impressions around the lifting hooks are swabbed with oil. These impressions are then filled with facing sand and smoothed over with a slick. All loose sand or foreign matter is then removed by means of an air hose directed over the surfaces of cope and drag. Mold is then closed and poured immediately.

Metal is placed in clay-graphite or carborundum crucibles and melted in anthracite coal-fired, pit type furnaces. When the temperature of the metal reaches 1300 deg. Fahr., it is poured immediately into the mold; the work being scheduled so that the mold and metal are ready at the same time.

Accurate temperature control is employed not only to improve the physical properties but also to obtain a uniform minimum shrinkage. The job is double poured, pouring 50 lb. of metal through each of the two wedge shaped gates.

After pouring, the heads and gates are relieved by removing the sand from around them so that they may be

free to move as the casting contracts, and thus facilitate rather than retard the contraction of the casting to avoid internal stresses that might result in distortion. Likewise to prevent distortion, proper time is allowed for cooling before shaking out the casting. Heads and gates are removed by sawing, also a distortion preventative, and then ground to the level of the surface surrounding them. Fins, if present, are removed by grinding.

Fig. 3 is a mold ready to close, in the foreground, and the pattern in place on the follow board, in the background. Note that the hooks have been covered with sand, seen as spots on the cores. The cope shows three round heads or risers, one over each of three lugs; and the two wedge gates which are located near the other three lugs. These lugs may be seen on the pattern. They are to support a motor to be placed on top of the finished casting.

Six of the ten chills used in the mold are located under these lugs. The chilling and feeding of the metal in the vicinity of the lugs is a precaution taken due to the cross sectional area of the lugs being much greater than the casting in general. Nails with large heads are inserted in the cope, hardly visible in the photograph, to chill the metal at the junction of main body of the casting and the three large ribs. Attention is also called to the sturdy construction of cope, drag and pins.

Fig. 4 gives the cope side of the casting showing heads and gates. The other side of the casting after machining and ready to be assembled is also shown. The casting is approximately 32 in. sq., with ribs about $\frac{3}{16}$ in. thick.

Machining and Assembling

Machining of these castings consists simply of placing the casting on the table of a milling machine and milling the end ribs or flanges which are to be secured to the duralumin sheets. In the case of castings with lugs or bosses, such as the one described, it is also necessary to mill the faces of the lugs or bosses. Only an average of 0.02 in. is removed from a flange by the milling cutter and no further machining is done except the drilling of the holes. Furthermore this machining is done without laying off the castings.

Holes $\frac{17}{32}$ in. in diameter, to accommodate $\frac{1}{2}$ -in. bolts, are drilled in the flanges with the aid of jigs or templates. The assembly of the chute is accomplished by securing $\frac{3}{16}$ -in. duralumin sheets to the flanges of these castings by means of steel bolts previously dipped in asphaltum paint to avoid galvanic action accompanying the association of two dissimilar metals in the presence of sea air. After the bolts are secured, their heads and the nuts are given another coat of asphaltum paint. The chutes when completely erected are painted with aluminum paint and are then ready for use, presenting a very neat fitting assembly of creditable appearance.

By these means, due primarily to accuracy in foundry practice, a great deal of time and labor are saved, thus materially reducing the cost of the finished product.

Many large as well as small castings of intricate shape are manufactured in this manner. For example, a ring shaped assembly approximately 19 ft. in diameter consisting of 18 segments, each an intricate casting, was molded in this manner having only the bolting flanges trued up by milling a maximum of 0.02 in. off each edge of each segment. When erected, this assembly was found to be within a tolerance of plus or minus $\frac{1}{8}$ in. in the entire circumference of about 60 ft.; or in other words, it fitted practically perfect. These castings also were not laid out, only the usual milling and drilling of holes by the aid of jigs or templates.

All castings made in this manner have passed rigid inspection with few rejections, and so this procedure, when closely controlled in all details, may be regarded as eminently satisfactory, practical and economical.

Economic Use of Electric Furnaces

Analysis of Production Costs, Electricity vs. Natural Gas in Heat Treatment of High Grade Shovels

BY WIRT S. SCOTT*

SEVERAL brands of shovels made by the Baldwin Tool Works, Parkersburg, W. Va., may be outlined as follows: Alloy Steel brand, made from molybdenum steel, each shovel heat treated; Optimus brand, made from manganese steel, light weight, each shovel heat treated; Monongah Featherweight brand, made from high-carbon steel, light weight, each shovel heat treated; Pinnacle brand, made from high-carbon steel, standard weight, each shovel heat treated; Knoxall brand, a competitive product, not heat treated.

Steel from which the blades are made is purchased in large sheets cut to specified widths and lengths. In the forge department the sheets are cut first into multiple lengths, as required by the length of shovel blade, and then into rectangular pieces, as required by the width.

To this flat, rectangular piece of steel is welded a strap of soft steel. A flat drop machine is used for smoothing the blade, and it then passes to a trimming machine, where it is cut to exact size. The blade is then heated in a furnace, placed in a die, and by means of a drop, receives its final shape. By a somewhat similar process the strap is shaped to receive the handle.

From the forge room the alloy steel and high-carbon steel shovels go to the heat-treating room, for hardening

and tempering. Since the company has had experience with both fuel furnaces and electric furnaces, of the same general type and dimensions, and used in exactly the same manner, a comparison of results is possible.

Heat Treating with Gas

Parkersburg is in one of the most favorable territories for natural gas supply. Natural gas of 1000 B.t.u. value is sold for 32½c. each thousand cubic feet.

Three gas furnaces, rectangular bath type, lead hardening and lead tempering, were installed, one being a spare. Nickel-chromium vessels were used, each about 18 in. wide, 46 in. long and 17 in. deep. Pyrometers indicate the temperature of the bath. Crushed coke was used on top of the baths, to reduce the lead loss.

The record of the heat-treated production, gas, lead and coke consumption for nine months, ended Jan. 31, 1929, is given in Table I.

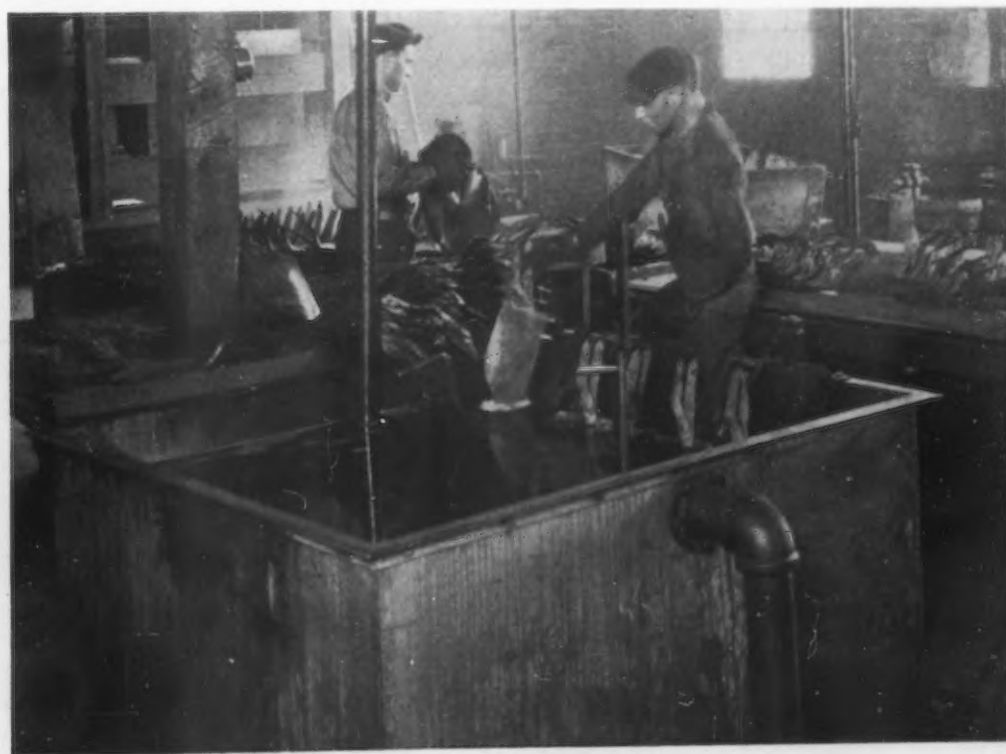
Electric Furnaces Put In

Two duplicate electric furnaces are installed, each of 65-kw. capacity. This high capacity was not required by the tempering furnace, but the customer wanted both units to be available for either hardening or tempering.

As in the case of the natural gas furnaces, the vessels

*Special representative, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.

QUENCHING
Shovel Blades in Oil, Special Jigs Holding the Blades. For large shovels, such as scoops, the heated blade is placed in a form mounted on an elevated hand-operated conveyor, which permits exact quenching without distortion



are made of nickel chromium, 18½ in. wide by 46½ in. long at the top, 14½ in. wide by 42½ in. long at the bottom, and 17¼ in. deep. The furnace shell is a heavy plate box with riveted and welded corners, surrounding the insulating and refractory brickwork. The furnace chamber, lined with refractory brick, supports the heating elements on the side walls and on the bottom.

Having wide flanges, the vessels rest on suitable supporting brickwork. After the vessel is in position nickel chromium alloy aprons are placed around, overlapping the flanged sides. Over this is put a heavy iron protective plate, covering the entire brick-work. This plate is cut out so as to expose the vessel and protective apron, but overlapping the apron. This construction effectively prevents molten lead, scale or other materials from getting down into the brickwork or furnace chamber.

Two thermocouples are used with each furnace, one in the bath, the other within the furnace chamber. The protected-type thermocouple in the bath operates a temperature recording and controlling pyrometer. By means of magnetic contactor switches, this functions to control the temperature of the lead bath. The thermocouple placed in the heating chamber is of the bare type, and is connected directly to a temperature control pyrometer.

This arrangement of thermocouples and control not only prevents excessive temperatures building up within the furnace chamber, but operates to reduce the temperature variation or surges within the bath. Fluctuations of temperature within a large bath of molten lead has been a great disadvantage of that form of heating. Unless the temperatures of both bath and heating chamber are under coordinated control, there is no hope of obtaining a sufficient uniformity of temperature for quality production.

Hardening the Product

Shovels are immersed in the lead to a depth of about four-fifths the blade length. An average shovel having a blade 10 in. wide by 12½ in. long by 0.086 in. thick has an immersed depth of 10 in. The weight of this immersed stock is 27 lb. per dozen shovels. The largest shovel heat treated has a width of 15½ in. and is immersed to a depth of 15 in.

A very heavy bed of powdered coke—about 2 in. in depth—is placed on top of the lead. This unusual depth retains the shovel blades down in the molten lead without any other means of holding them. Otherwise special hooks would be required for this purpose, or the shovel held in the bath by hand until heated.

The hardening bath control is set to maintain a temperature of 1475 deg. Fahr., and the tempering bath 700 deg. Fahr. From four to six shovels are placed in the hardening bath at one time, and from 12 to 34 in the tempering bath.

In hardening, one shovel is removed from the bath, and quenched in oil; a blade previously quenched is removed from the quench and placed on a drain board accessible for the operator doing the tempering, an unheat-treated shovel is placed in the hardening bath, completing the cycle. Twenty shovels can be hardened in 4 min., or at the rate of five shovels a minute, but this pace is not maintained throughout the day, since the operator gives a certain amount of attention to obtaining his supply of shovels.

Method of Tempering

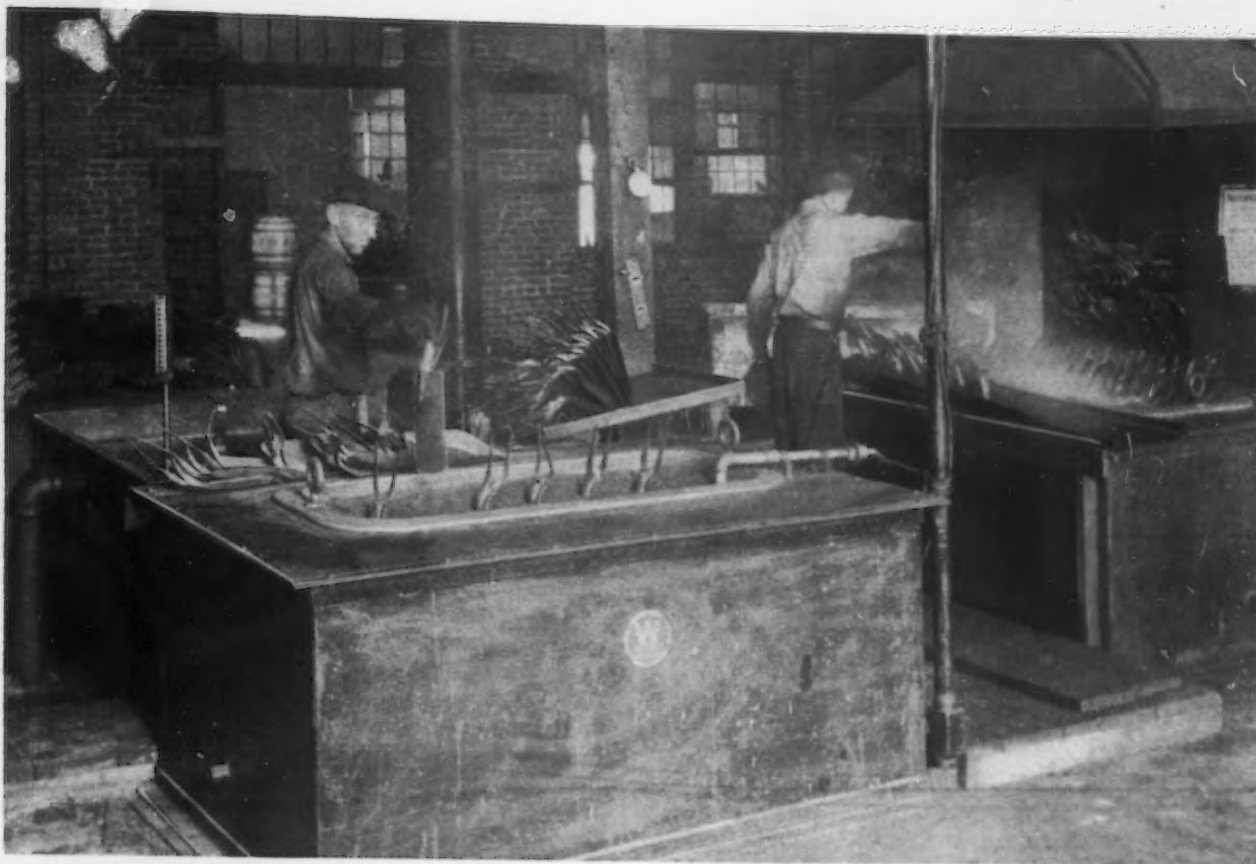
Tempering immediately follows the hardening process, but the operation of the furnace is somewhat different. The hardened shovels may be removed from the drain board in batches, and placed in the tempering bath, completely filling the vessel, the shovels nested together as closely as possible for convenient handling. In one case the shovels were nested in two rows, of 18 and 16 shovels. A dozen or more shovels may be removed at one time, and placed in a large box mounted on a truck. A half dozen hardened shovels then take their places in the bath, and the operation continues until the entire batch has been removed from the furnace.

Reloading the furnace or bath then continues until the vessel is again full. The production capacity of the tempering bath is greater than that of the hardening bath, hence the shovels may be tempered at the same rate as hardened.

The electric furnaces were placed in operation Feb. 1, 1929, and meters were installed a little later for measuring the power consumption. The production records for



General View of Gas-Fired Lead-Bath Furnaces



Heat-Treating Department for Hardening and Tempering Shovels. The shovels are heated to 1475 deg. Fahr. in the bath-type furnace in foreground, quenched in oil, and placed on the drain board (rear center) to drip. They are then tempered at 700 deg. in the bath-type furnace shown at right

April (26 days), May (25 days) and June (10 days), are shown in Table II.

Comparing the Results

ANALYZING the production figures for gas and electric furnaces, from Tables I and II, a true comparison can be obtained of many things of importance in determining the relative values of the equipment.

Electric Furnace Analysis

Kilowatt hours consumed per dozen shovels heat treated	4.63
Lead consumed per dozen shovels heat treated, lb.	0.29
Man-hours of labor per dozen shovels heat treated	0.1155
Shovels produced per working hour, dozen.....	17.50

Gas Furnace Analysis

Gas consumed per dozen shovels heat treated, cu. ft.	70
Lead consumed per dozen shovels heat treated, lb.	0.71
Man-hours of labor per dozen shovels heat treated	0.16
Shovels produced per working hour, dozen.....	12.90

Heat Energy Costs

In determining the relative costs of electricity vs. gas, April, 1929, was taken as the basis. Electricity is purchased from the public service company, primary power, at \$1.10 for every kilowatt of measured demand, plus an energy charge, block rates, varying with the amount consumed. As the purchase of power for other purposes must be done regardless of whether or not the electric furnaces are used, they are here charged with current at the rate of 1c. to the kilowatt-hour, as in Table III.

Using the current rate of \$0.0125 per kw-hr. and \$0.325 per M for gas, the monthly cost for a production of 4339 dozen shovels will be:

Electricity, 19,840 kw-hr. at \$0.0125.....	\$249.23
Gas, 308,069 cu. ft. at \$0.325.....	\$100.12

Lead Cost

Since the lead consumption as shown by any one month may not represent accurately the actual consumption, an

Table I—Heat Treating with Gas

Month	Man- Hours	Lead, Lb.	Coke, Lb.	Oil, Gal.	Gas, Cu. Ft.	Shov- els, Dozen	Actual Work- ing Hours
May, 1928	306	1,840	3,825	...	119,240	2,034	153
June	413	1,700	...	...	179,960	2,312	207
July	421½	1,900	...	...	219,230	2,799	207
Aug.	295	1,010	...	520	126,950	1,902	144
Sept.	351½	1,815	...	...	155,870	2,121	171
Oct.	475½	2,004	...	...	191,460	2,621	215
Nov.	458½	1,414	...	...	201,820	2,848	223
Dec.	425	2,318	...	260	185,309	2,654	207
Jan., 1929	497	2,222	...	...	226,360	3,511	243
Total ..	3,643	16,223	3,825	780	1,606,199	22,802	1,770

Table II—Heat Treating with Electric Furnaces

Month	Man- Hours	Actual Working Hours	Lead, Lb.	Kilowatt Hours	Maxi- mum 15-Min. Demand	Shovels, Dozen
April	481	236	1,200	19,840	63.0	4,339
May	436	214	950	15,880	64.0	3,413
June	172	89	655	7,920	61.9	1,685
Totals ..	1,089	539	2,835	43,640		9,437

Table III—Power Rate Structure for Electric Furnaces

Energy charge—19,840 kw-hr. at \$0.01 per kw-hr.	\$198.40
Demand charge—63 kw. demand at \$1.10 per kw.	69.30
Total April bill.....	\$267.70
Discounts, 5 per cent for primary service and 2 per cent for prompt payment.....	\$18.47
Net April bill.....	\$249.23
Net rate per kw-hr. = $\frac{\$249.23}{19,840}$ = \$0.0125	

average figure should be used, based upon as long a period as possible.

	Gas Furnace	Electric Furnace
Lead consumption, lb. per dozen shovels...	0.71	0.29
Total for 4339 dozen shovels.....	3,080	1,260
Monthly cost, at 6¼c. a lb.....	\$192.50	\$78.65

Labor Costs

The men operating the gas furnaces were paid from 45 to 55c. an hour. With electric furnaces, less experienced help could be used. It was stated that young men from various parts of the plant were often drafted to operate the furnaces, and became thoroughly proficient within a day's time.

In the absence of a definite labor rate paid during the operation of the electric furnaces, it is safe to assume that the rate is the same as with gas, an average of 50c. an hour.

	Gas Furnace	Electric Furnace
Man-hours of labor per dozen shovels produced	0.16	0.1155
Man-hours to produce 4339 dozen shovels.....	694	501
Labor cost, heat treatment of 4339 dozen shovels	\$347.00	\$250.50

Comparative Production

Production figures are based upon actual working hours required to turn out a given quantity. With gas and electric furnaces of equal size, the production figures given below show the comparative value:

	Gas Furnace	Electric Furnace
Dozens of shovels.....	22,802	9,437
Actual working hours.....	1,770	539
Dozens of shovels produced per working hour	12.90	17.50
Working hours required to produce 4339 dozen shovels.....	336	248

Increased production capacity of electric furnaces over gas furnaces for the given size was found to be 35½ per cent. It is to be noted that the figure of 248 hr. is an average, whereas the actual time was only 236 hr. But, since an attempt is made to set up basic figures for comparison, the average value must be used.

Vessel Maintenance

Maintenance for the furnaces is that due to depreciation of the vessels, and that required for general upkeep. Vessel maintenance is based upon results obtained at customer's plant with gas furnaces, plus results obtained through definite information received from a large number of electric furnaces.

Cost of vessel, installed in pot, was \$800. Life of vessel, electric (hardening), is placed at 6500 hr. and life of vessel, gas (hardening), at 2500 hr. Basis for maintenance is April, 26 days, and a production of 4339 dozen shovels.

Electric, working hours.....	248
heating up, 1 hr. each day.....	26
Total, hours use.....	274
Gas, working hours.....	336
heating up, 3 hr. each day.....	78
Total	414

Useful life of vessels used up during April was:

$$\text{Electric, } \frac{274}{6,500} \times 100 = 4.22 \text{ per cent}$$

$$\text{Gas, } \frac{414}{2,500} \times 100 = 16.56 \text{ per cent}$$

Vessel depreciation during April was thus:

$$\text{Electric, } \$800 \times 0.0422 = \$33.76$$

$$\text{Gas, } \$800 \times 0.1656 = \$132.48$$

No repairs of any nature were made to the electric furnaces during the past year of operation and they show no signs of deterioration. A general charge of \$10 under this item, each month, will amply cover all contingencies.

Based on previous production, and corrected for present production, each gas furnace was shut down four times a year for two days each time for minor repairs. Labor of two men for two days, plus materials, call for annual expenditure of

16 man-days at \$4.50.....	\$72
Materials	32
	\$104

Each furnace was shut down every three months for complete rebuilding. Labor, six days each time, for two men, made

48 man-days at \$4.50.....	\$216
Materials	400
	\$616
Total yearly cost.....	\$720
Average monthly gas furnace repairs...	\$60

Air for Gas Furnaces

For the gas furnace a 5-hp. motor was required to operate the blower and the pump for circulating the oil quench bath. With the electric furnaces a 2-hp. motor is required for circulating the oil. The saving, therefore, is the power consumed equivalent to 3 hp.

At 314 hr. a month, for a 3-hp. motor at 80 per cent efficiency, the power consumption will be

$$314 \times 3 \times 746 \div 0.80 = 878 \text{ kw-hr.}$$

Monthly power cost for supplying air to gas furnaces:

$$\$0.0125 \times 878 = \$10.98$$

Investment Charge

The three gas furnaces cost approximately \$4,500 installed; the electric furnaces, \$7,900. With interest and depreciation at 15 per cent, the investment charges are as follows:

Gas Furnaces	
Annual charge on \$4,500.....	\$675.00
Monthly charge	56.25
Electric Furnaces	
Annual charge on \$7,900.....	\$1,185.00
Monthly charge	98.75

Summary

COMPLETE summary of electric and gas furnace production costs, based upon one month's production of 4339 dozen shovels, appears in Table IV.

Table IV—Total Production Costs

	Electric Furnaces	Natural Gas Furnaces
Electric or gas bill.....	\$249.23	\$100.12
Lead consumption.....	78.65	192.50
Labor for heat treatment.....	250.50	347.00
Vessel depreciation.....	33.76	132.48
General repairs.....	10.00	60.00
Air for gas furnace.....	...	14.23
Interest and depreciation.....	98.75	56.25
Total	\$720.89	\$902.58
Monthly saving, using electric heat, including all factors accounted for by book records.		\$182.31
Annual savings		\$2,188.00
Return on investment.....		27.6%

William H. Baldwin, president of the Baldwin Tool Works, states that the improved quality of product, the uniformity of results and the ease with which the furnaces may be operated by relatively inexperienced men, make the cost of power a negligible item. Replacement of shovels due to defects not showing up until placed in service, come from many sources besides heat treatment. However, these rejects, from all causes, have been reduced one-fifth since electric heat treatment was adopted.

No. 4 steam generating unit in the East River Station of the New York Edison Co., comprising a 1500-hp. boiler, equipped with water-cooled furnace and air preheater, and fired by the Lopulco storage system for burning pulverized fuel, recently gave a 532 per cent rating for 72 hr. operation.



Nordmarks Iron Mine near Philipstad, Sweden

*A*N old steel engraving depicting the methods of iron ore mining in another century is here reproduced in THE IRON AGE by courtesy of the Swedish Iron & Steel Corporation, 17 Battery Place, New York. Mines in the Province of Varmland, where the Nordmarks is located, have been operated for more than 400 years. The pig iron made from its low-phosphorus, low-sulphur ore is used in the production of strip steel for razor blades, clock and watch springs. Most of the razor blades made by a leading American manufacturer have been of steel made from this ore.

Layout of a Manufacturing Plant

Sequence of Departments in Which Aircraft Engines Are Made by the Wright Aeronautical Corporation

BY FAY LEONE FAUROUTE

ONE of the largest organized manufacturing units in the aeronautical industry is the Wright Aeronautical Corporation plant. While less than a year ago it was able to perform its activities in one large building and a part of another, the production demands of this year have made necessary an expansion into a group of twelve buildings, all but one of which lie in a closely connected group between Gray Street and Madison Avenue, immediately adjoining the main line of the Erie Railroad at Paterson, N. J.

Plant No. 1 has 10.5 acres and a manufacturing floor area of 502,345 sq. ft. Plant No. 2, some distance south-east and on the other side of the Erie Railroad, contains 17.4 acres and a floor area of 128,000 sq. ft., the main building being a new foundry recently put into operation. There is available here for future development a space of 15.6 acres.

Composed of concrete, steel, brick and glass, the buildings are modern in every respect, and exceptionally well lighted. The machinery is grouped so that there are large aisles along each wall and through the center. Physically this gives the whole plant an airiness and spaciousness which is delightful. One has the feeling of being in a tool room rather than in a manufacturing establishment. Much of the machinery is new and of special design. The men are high-grade and skilled.

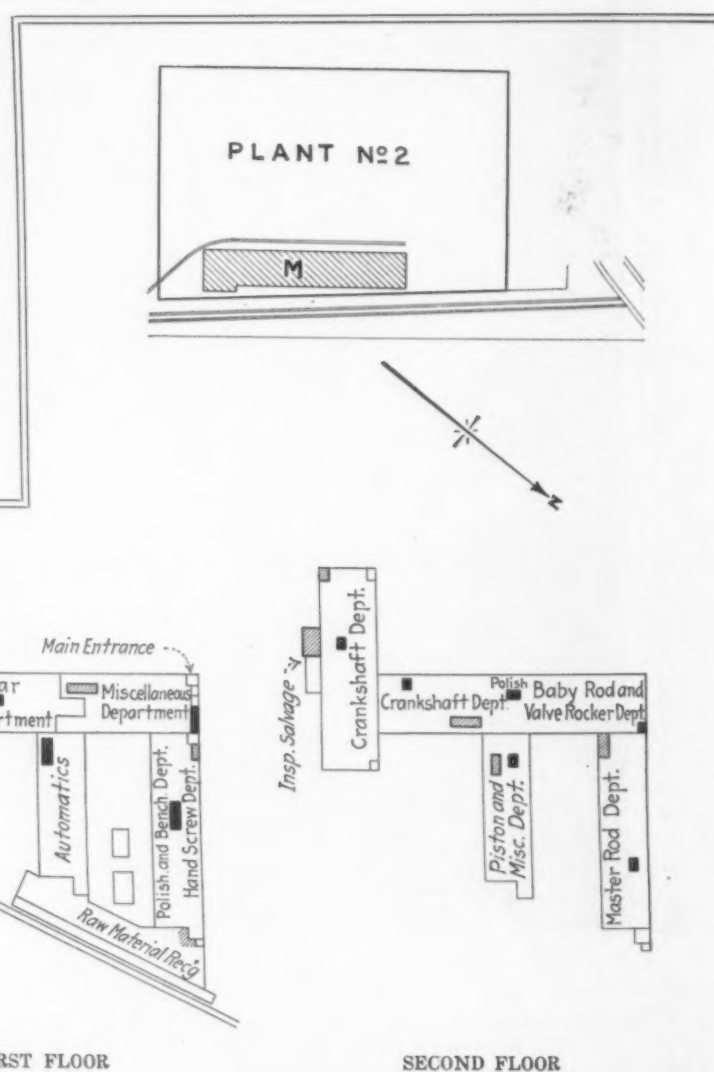
Plant Laid Out for Flexibility

Guy Vaughn, the general manager, evidently has had the vision of a rapidly growing industry and has laid his foundations for a system of mass production and unit

assembly which will make the shop not only presently efficient but capable of being adapted readily to new models.

Many of the special drilling tools, multiple drills, Bullards, automatics, lathes and grinders have been set up for a specific job, but, because they have standard heads and have been designed and assembled from standard parts, there will be little difficulty in keeping this factory in that state of flux which any rapidly growing industry such as the aeronautical seems to demand just at present.

A glance at the accompanying diagrams will show the efficient manner in which these various departments have been laid out. Generally speaking, the work progresses



ARRANGEMENT of Principal Manufacturing Departments Is Shown on the Four Floor Plans at Right. These include buildings A, B, C, D and G, as indicated on the general plant layout above them. The new foundry, M, was described in *THE IRON AGE* of Dec. 12 and 19. Locations of inspection stations and work assignment stations are brought out clearly in our drawings

in an orderly procession from rough stock to finished component, the emerging streams meeting at proper points to facilitate later operations and minor assemblies. While the amount of production has not yet reached a point where conveyor systems and the other paraphernalia of intensive mass production are necessary or can be used with profit, there is the beginning of a hand-operated assembly line.

Engines are mounted on special assembling frames equipped with wheels so that the whole unit may be moved along the track as the work grows. Of course in some departments it has not been desirable to locate machine tools in productive order; the amount of work of one form or of one model is not large enough to make this desirable. But in such bays as those devoted to the manufacture of the crankshaft, cylinder and cylinder head, master rods and "baby" rods, crankcase, piston and valve rocker arms, one may see the production sheet visualized in the line of machine tools which makes the steps of production easier to follow.

Arrangement of Departments

Beginning with the first floor, one enters a miscellaneous department, traversing a gear department and two other wings filled with automatics, polishing and bench work, a hand-screw department, a raw material receiving room, a pipe shop and a heat-treating department. The latter has been recently installed, the inadequate old department having been torn out some months ago. There

is on this floor also, but in another building, a production test, a main assembly and the final test.

Climbing a stairway to the second floor, the visitor sees the crankshaft department, passes through a polishing section, and the "baby" rod and valve rocker departments. In the wings extending to the south are the "master rod" department and a floor devoted to piston and other miscellaneous parts. The third floor is almost entirely devoted to crankcase and cylinder production. The general offices, engineering department, factory offices and experimental department occupy the greater proportion of the fourth floor, although there is a northwest wing containing a tool room, machine repair, tool inspection and main crib.

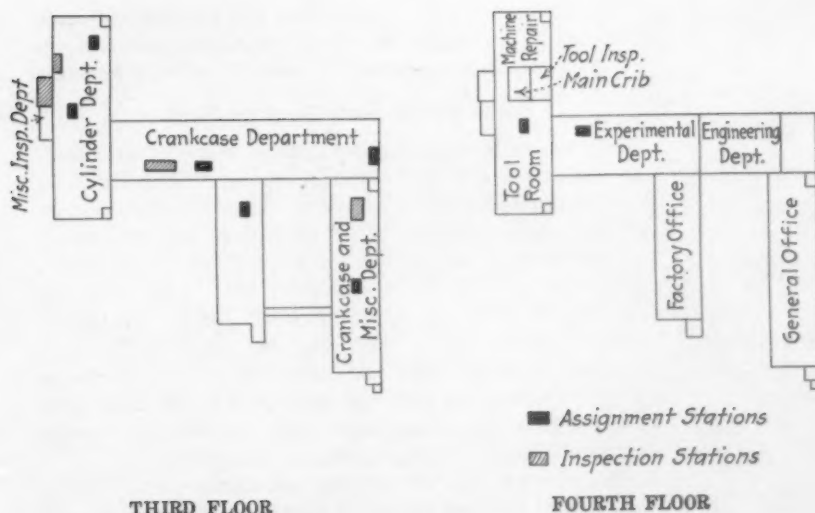
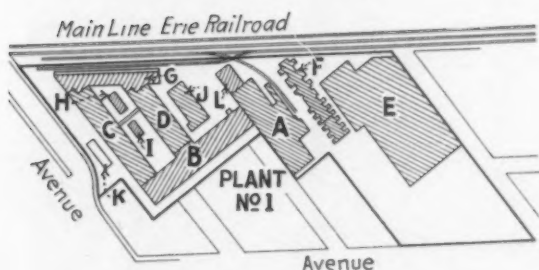
Engaged as they are in the manufacture of a precision power plant upon which the lives of pilot and passenger alike are dependent, Wright workmen seem to sense their moral obligations to the public. All their methods and forms of inspection are characteristically fine. Unusual means are taken to maintain the integrity of castings and forgings, and the special alloys of aluminum and steel are made up according to formulas which rigid tests and experience have set up as adequate.

In an article devoted to the Wright foundry and Wright foundry practice the manner in which the intricate crankcase and cylinder head castings are made is described and discussed. The Wright Corporation makes all of its own castings, so it may control to a nicety the initial production of these important components.

Forgings for important steel parts, such as the crankshaft and the connecting rods, are purchased outside, but manufactured under the scrutiny of Wright inspectors. So much metal is taken off in the process of machining that there is little opportunity for a defect to get by. Furthermore, there are adequate tests and inspection between successive machining operations and a gruelling production test. And the engine is completely disassembled again, carefully inspected and reassembled preceding a final test, before it is turned over to the shipping department for its final touching-up, crating and delivery.

While many of the operations on smaller parts show little divergence from characteristic automotive work of a fine quality, yet there are some six or seven major parts whose method of fabrication is worthy of detailed description. Hence they were given in detail in a series of articles in THE IRON AGE of July 18, Aug. 8, Aug. 15, Aug. 22, Aug. 29 and Sept. 5, 1929.

Plants of Wright Aeronautical Corporation Paterson, N. J.



Buildings Shown in General Plant Layout

- A—Four-Story Main Building
- B—Four-Story Head Building
- C—Four-Story East Wing
- D—Four-Story Center Wing
- E—Assembly Building
- F—Production Test Building
- G—Rough Stock
- H—Pickle House
- I—Oil House
- J—Experimental Test
- K—Master Transformer Station
- L—Boiler House

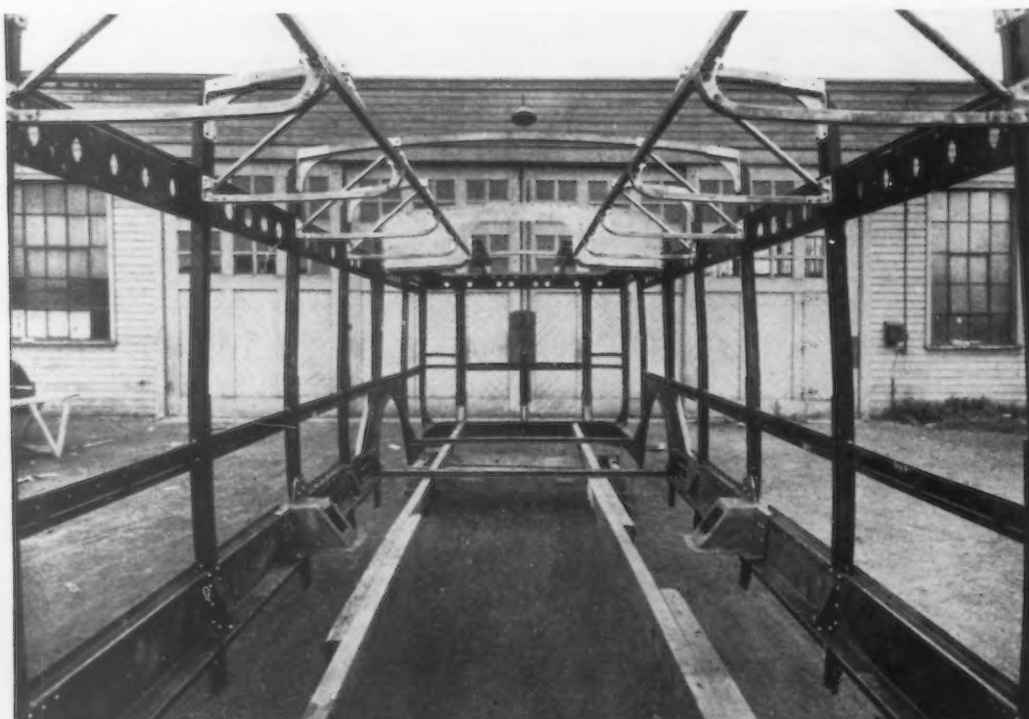
Making Motor-Bus Bodies of Steel

Die Costs Limit This to Multiple Production—
Sheets, Formed to Shape, and Tubing
Are Large Factors

BY FRED L. PRENTISS*

MOTOR-BUS transportation has gained so rapidly the past two or three years that there has been a steady increase in the production of buses. The manufacture of bus bodies has thus become well established as an important branch of the automotive industry. And the larger output of buses and the greater demand for bodies has enabled bus-body manufacturers to develop their methods with a view to increasing efficiency in pro-

duction. When bus-body orders were for single or, at most, for very few units it was difficult for the steel bus-body frame to compete with the composite body made of wood reinforced with steel. If only a small number of bodies of a certain design was wanted, it was much cheaper to make them of composite material, as the expense of making dies for a few units made the cost of steel frames almost prohibitive.



INTERIOR of Assembled Body Frame. Longitudinal square tubing (top, center) carries baggage racks at sides. Roof rafters are at alternate pillars

duction, and to make considerable progress in standardization.

There were 9000 motor buses built in this country in 1928 and the number now in operation is placed at 92,000. These figures indicate the importance which the industry has attained.

Developments of passenger bus transportation include the formation of large bus companies through the merger of small companies serving comparatively small areas, and the entrance of the railroads into the bus transportation field. It is stated that 72 railroads are now furnishing motor-bus transportation. The tendency toward the operation of buses in larger fleets than formerly has resulted in some standardization of motor-bus equipment by the transportation lines, working in cooperation with bus and body manufacturers.

Steel Dies Require Multiple Units

The steel industry has profited by the movement toward standardization in the bus-body manufacturing industry.

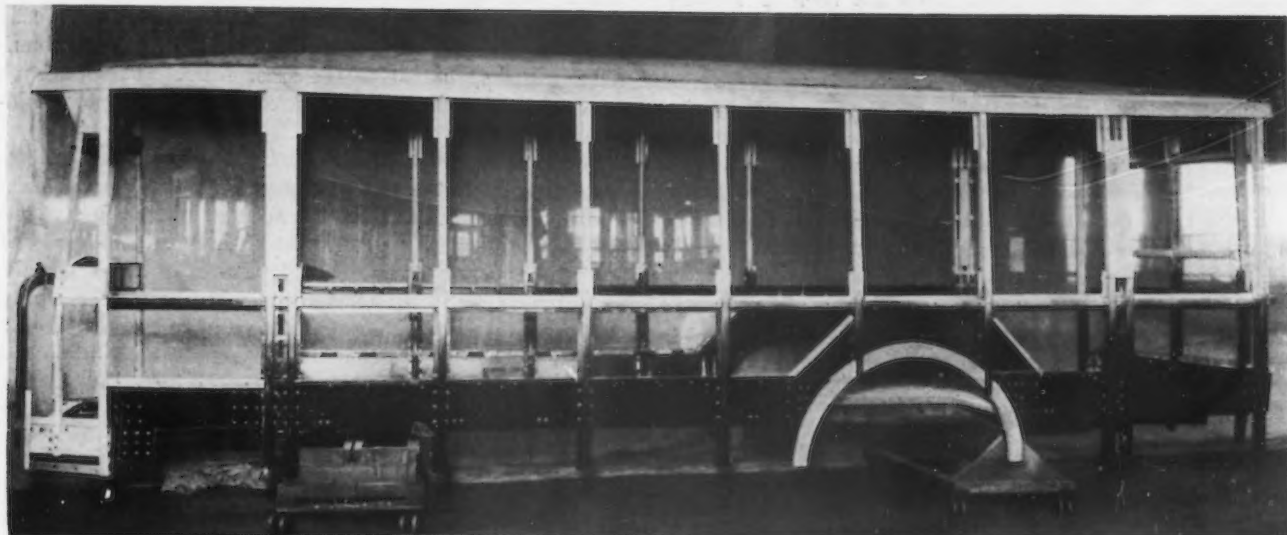
*Resident editor, THE IRON AGE, Cleveland.

In addition, bus-body makers had to meet and overcome resistance to a change, the same resistance that the all-steel body met in the automotive industry a few years ago.

Standardized Steel Sections Used

Bus bodies having all-steel frames made of standardized sections are being manufactured by the Lang Body Co., Cleveland. These lack little of being all-metal bodies, as their outer covering is of aluminum and practically the only wood is the flooring and wood fillers on the inside, the latter serving as a deadener for noise and for attaching the interior finish of wood, leather or velour. While the metal frame, weighing 1800 to 2000 lb. for a large bus, is heavier than the composite frame, it is stated that the finished bus body having a steel frame is as light as one with a composite frame built according to specifications identical except as to frame material.

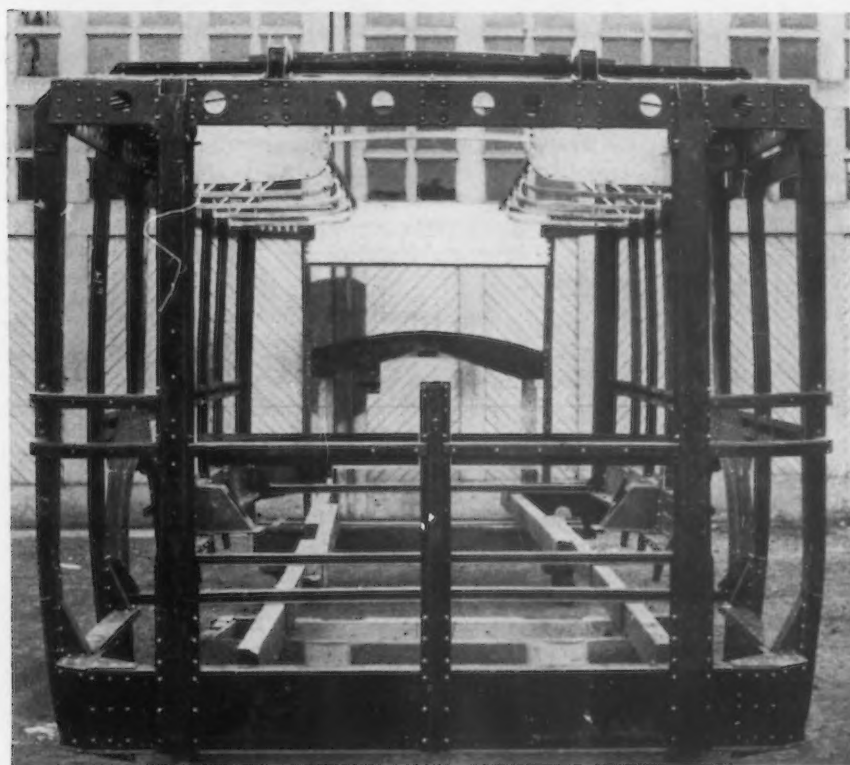
Advantages claimed for the steel-frame bus are its greater strength and safety to passengers in case of accidents. While manufacturers expect a longer life of a bus body with a steel frame than from the composite



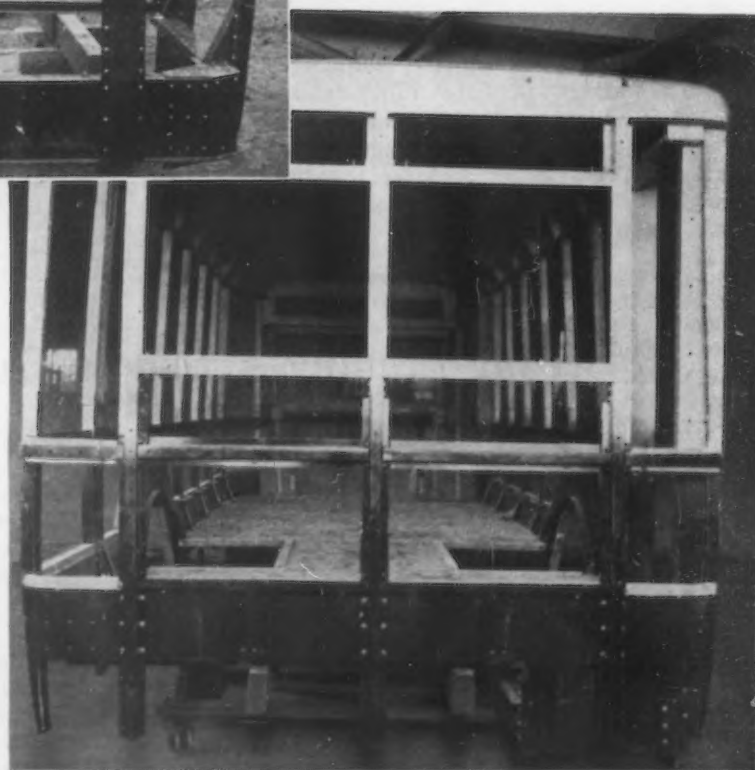
L EFT Side of Assembled Body Frame (Above), with Haskelite Roof in Place. Lower members provide for fastening the body to the chassis

* * * *

S TEEL Body Frame, Assembled (Left), Viewed from Rear. Frame members are joined by hot riveting. Toncan steel or aluminum parts are used where exposed to weather



R EAR of Assembled Body Frame (Right), with Wooden Fillers in Place. Many of the steel members are pressed from steel sheets of varying gages. Riveting work will be noted, on the underframe and elsewhere, on all the news on this page



frames, the steel-frame buses have not been in service long enough to substantiate this claim.

The frame of the Lang body bus is made of steel sections standardized in form, but varying in size and length, depending on the type and size of the bus. The main sills, which extend the length of the frame at the bottom of the two sides, are deep Z-sections, to which curved sections serving as the wheel housings are riveted and spliced near the rear end. To the sills are fastened uprights or pillars of channel form. Attached near the top of the pillars and extending the length of the body is a roof rail. This is a pressed channel section in which are lightening holes with a minimum diameter of 2 3/4 in. The holes also provide an opening through which a hand and tool can be inserted to hammer out dents that may be made in the outer metal covering during service.

Channel sections extend the length of the sides between the pillars at a point a little below the windows. The main sills are inside the pillars above the chassis line. On the outer side of the pillars, or along the outside of the body, are pressed steel buffer rails which serve as a brace to the chassis and relieve the sills of shocks that might be caused by collisions.

Rafters extending across the top of the frame for supporting the roof are attached to alternate pillars. Longitudinal members of square seamless steel tubing extend two-thirds the length of the bus beneath the rafters, for carrying the baggage rack. This is formed by similar sections connected to these longitudinal members and to the pillars. The various fabricated parts used in the construction of the rafters, baggage rack and supporting members for the roof are joined together by aluminum castings to which the steel members are riveted. The roof, which is of Haskelite, extends from roof rail to roof rail.

Under the frame at each chassis outrigger a cross sill made of a pressed channel section is riveted to the sills and bolted to the chassis outrigger. These serve as ties for the body and as bolting members for fastening the body to the chassis. The frame members are all joined by hot riveting, except a few minor joints which are welded because of their inaccessibility for riveting.

Formed Sheet Steel Used Largely

The pillars of Toncan steel and other metal parts exposed to weather are of that steel or aluminum. The side and cross sills and roof rails are of blue annealed sheets. The rafters are of metal furniture sheets. Sheet steel of various thicknesses is used for the different members, ranging from No. 12 gage to 1/4 in. for cross sills, No. 13 to

No. 10 gage for side sills, No. 16 to No. 12 gage for the pillars and for the roof rails. The outside paneling is No. 14 gage, one-half or three-quarters hard, gray sheet aluminum, which is bolted to the steel frame. There are no exposed bolt heads, as these are covered with hollow molding of aluminum or steel.

In manufacturing the steel frame sections steel templates are used in the blanking, punching and forming operations. This practice has been adopted to assure a duplication of holes and parts so that all service parts ordered for replacement will be exact duplicates of the originals.

All parts requiring holes are punched flat. All forming is done with the work located by holes, instead of having the edge of the sheets come in contact with a stop on the press. Certain holes are located for jig holes and, when possible, these are used also for structural holes. The jig is a permanent, adjustable fixture attached to the front and back of the press.

All templet holes are 5/8 in. in diameter, regardless of the size of the hole to be punched in the sheet. The templet is clamped to the blank and the holes are punched on a press equipped with a 4-gag punch holder, designed for use in punching holes in four sizes, one at a time. A 5/8-in. spring plug is used to locate the holes. By the methods followed both speed and accuracy in punching holes have been increased.

The set-up for the forming operation with the use of templates requires more time but, it is stated, results in more accurate work. The various operations involved in the making of parts are done without the use of blueprints. However, blueprints are used in the assembling operations.

Sub-Assembly Method Employed

A complete bill of material is kept for each part, as well as a drawing record, which shows the location of the parts. Every part is detailed on a bill of material and bears a number which is used in ordering service parts.

Sub-assemblies are made of the larger units that form the frame. These are the sills, the roof rails, pillars and wheel housings. These four units are brought together in box-type, adjustable assembly jigs where they and other minor parts are put together to form the final assembly of the frame. The parts and frames when completed are handled by hand hoists operated on two runways above the assembly line. When the assembly is completed the frame is lifted from the jig and placed on a dolly, on which it is moved to the painting room.

All parts of the frame are given two coats of asphalt paint. Each part is dip painted before assembly and the second coat is applied after assembling.

Offsetting Peening Action on Overhead Tramway Rails

FOR many years it was thought that the reason for the flange of an overhead carrying rail turning down was because the rail had been overloaded. This theory has long been exploded, according to E. T. Bennington, Cleveland Electric Tramrail Division, Wickliffe, Ohio, speaking at an engineers' meeting in Akron. If an overload were to cause the flange of the beam to turn down, it would turn down the first few days that such a system was in service. But it has been learned in practice that the turning down of the flange does not occur for a considerable period after the system is installed, and until it has been subjected to a great many passages of load-bearing wheels.

Only four ways are known to the author to provide a rail for an overhead system that will not be rendered use-

less in a short while by this peening action. Three of these are varying methods of providing separate wearing surfaces and attaching them to the lower flange of the I-beam (or equivalent) carrying the load. The fourth is a type of rail used by one manufacturer specializing in the construction of tramrail systems. This is rolled in one piece, and made of high-carbon steel. It provides a flange which will not be distorted by peening, although peening still takes place the same as it will in all of the shapes and suggestions offered.

In all four types the metal which is peened or expanded works off the rolling surface in the form of the flange without distorting the shape and without rendering it unfit for continued use.

Types of American Alloy Steels

Survey Gives Tonnage of Ingots and Castings Made in 1928—Some of the Uses

BY EDWIN F. CONE

INTEREST in knowing how much alloy steel of different types was made in the United States encouraged the making of a canvass of the 1928 production. Only open-hearth and electric steels were covered. The survey has given data for about 81 per cent of the ingot output and over 98 per cent of the alloy steel casting output.

The production, as compiled from the replies received from producing companies, and here tabulated, classifies 2,410,356 tons of alloy ingots (80.8 per cent of the 2,983,365 tons of open-hearth and electric steel recorded by the American Iron and Steel Institute) and 160,911 tons of alloy steel castings (98.7 per cent of the 163,236 tons of open-hearth and electric alloy steel castings made in 1928).

Copper and Chromium Steels Lead in Ingots

THE large quantity of copper-bearing steel ingots made in 1928—868,501 tons—heads the ingot alloy output. This is a measure of the extent of the copper-bearing sheet industry.

Second to this comes the chromium steel ingot output—302,204 tons—reflecting in part the production of stainless iron. If the production of chromium-nickel steel ingots is also considered in this classification, then over 536,000 tons of such steel is largely the rust-resisting steels—the stainless steels and the high-chromium-nickel steels. Of course, in these totals there is included the lower alloy steels, of which no small quantity is made.

Of considerable importance is the so-called medium-manganese steel, containing 1 to 2 per cent manganese—231,185 tons of ingots. There is an increasing demand for this grade.

The Molybdenum Alloy Steels

Another steel which is comparatively new is the nickel-molybdenum steel, of which 108,934 tons of ingots were reported for conversion into rolled products and forgings. Still more recent is the molybdenum-manganese steel, of which 2153 tons was reported, a steel of which probably more will be heard in ensuing years.

Probably the 67,214 tons of copper-molybdenum steel represents some alloy steel rails which are being experimented with by some of the American railroads.

That vanadium is a large factor in

American Output of Open-Hearth and Electric Alloy Steel in 1928—Gross Tons

Type of Steel	Ingots	Castings
Nickel	125,444	2,179
Chromium	302,204	9,453
Chromium-nickel	235,887	25,720
Molybdenum	1,075	175
Chrome-molybdenum ..	60,993	7,104
Nickel-molybdenum ..	108,934	542
Nickel-chrome-molybdenum	16,653	1,726
Vanadium	15,958	417
Chrome-vanadium	160,415	167
Medium manganese (1 to 2 per cent min.) ..	231,185	30,414
Hadfield's manganese ..	7,098	51,504
Copper	868,501	10,712
Copper-molybdenum ..	67,214	.....
Molybdenum-manganese ..	2,153	1,450
Others	206,642	19,348
Unclassified	570,009	2,325
Open-hearth	2,629,703	83,802
Electric	353,662	79,434
Total	2,983,365	163,236

the alloy steel industry is partly brought out by this survey in that over 176,000 tons of ingots were made last year in which this element was incorporated.

Many Special Steels Are Made

Under "other" alloy steels in the table, the 206,642 tons of ingots and 19,348 tons of castings include high-speed steel, nitralloy and special compositions not embraced in the other classifications. There are a great many such steels, one company enumerating such compositions as manganese-copper; high aluminum; copper-chromium and nickel; silicon and manganese; nickel, vanadium and chromium; silicon; molybdenum, chromium and vanadium, and so on.

Features of Alloy Cast Steels

IN alloy steel castings the feature is the large production of Hadfield's manganese steel (12 to 14 per cent Mn.) at 51,504. If the output of converter foundries were added to this total, it is probable that this would approximate 55,000 to 60,000 tons.

Outside of the high-manganese castings, which have been made for many years, the most important seems to be the chrome-nickel composition of which 25,720 tons was made last year. Some of this is the corrosion and heat-resisting material. Probably the 9453 tons of chromium castings includes the major part of the alloy steel, frogs and switches produced.

Attention may be called to the 7104

tons of chrome-molybdenum and the 1450 tons of molybdenum-manganese castings as well as the 10,712 tons of copper-bearing castings.

Chromium Leads Among Alloying Metals

The extent to which the four chief alloying metals were used in 1928 as alloys in steel may be summarized as follows in gross tons:

	Ingots	Castings	Total
Chromium	615,737	160,415	776,152
Nickel	486,918	30,167	517,085
Molybdenum ..	257,022	10,997	268,019
Vanadium	176,373	584	176,957

These data do not include all such steels, for the classification "other steels" embraces some containing each of these alloying metals.

Some of the Industrial Uses

IN response to the question as to the industries to which alloy steels are sent, the replies were exceedingly varied. Only a few of these are worthy of attention, as many of the uses to which alloy steels are put are generally known.

A large company making several varieties of alloy steel ingots indicated that its products went to more than 15 types of consumers, including automotive products and parts, car builders, agricultural implement manufacturers, ship builders, structural steel fabricators, culvert, roofing and tank manufacturers, fence and other wire products, razor blade makers, industrial machinery manufacturers, makers of shafting, drop forgings, springs and axles, not to mention tool steel and castings for steel plants and rolling mills.

Another large alloy steel producer, making principally ingots and a few alloy castings, sends its products to the oil, chemical, machine tool, mining and milling industries, as well as to public utility companies. A concern having a small alloy casting output states that some of its products go to the ceramic, electrical and general stamping industries. A great deal of alloy steel ingots ultimately find their way to incorporation in shear knives for the sheet metal and tin plate industry, according to a large electric alloy steel ingot maker.

Several companies on the Pacific Coast report that their alloy steel ingots and castings are finally used in the sawmill and logging industries. Still another producer, which makes open-hearth and electric alloy steel ingots only, indicates that its products

are for chain makers and ball bearing manufacturers, and automotive, machine tool and tool steel consumers. That a considerable quantity of alloy steel ingots is finally incorporated in thermostatic equipment and magnets and in saws, knives and other edge-cutting tools is the testimony of a representative alloy steel ingot producer.

A Western producer of many grades of steel ingots and castings, both alloy and plain carbon, reports that its large output of copper-bearing steel is furnished to the Navy for use for special purposes and that some of its copper-bearing ingots are converted in its own mills from sheet bars into sheets. Some of its chromium-nickel castings are furnished to makers of oil-well machinery as pressure castings.

A representative producer of the high-chromium-nickel steels supplies the electrical, oil, chemical, paper, kitchen equipment and architectural industries.

Among the makers of alloy steel castings, one in the Far West serves paper making, cement mills and vegetable oil mills, as well as the mining and logging industries. A Texas steel foundry reports that all its chromium-nickel alloy castings go to the petroleum industry. For heat, corrosion and abrasion-resisting conditions, an-

other company furnishes chromium and chromium-nickel castings, while an electric alloy-steel maker sends chromium-nickel castings to a steam hammer manufacturer.

A recently organized electric steel foundry makes six grades of alloy steel castings for crushing and grinding equipment, dredge-pump parts and equipment for cement plants. A large Eastern company which makes valves uses certain alloy castings, principally chromium-nickel, in its own product, and a Middle West foundry sends alloy steel castings to furnace manufacturers and heat-treating plants.

Alloy steel castings, made by a Pennsylvania foundry, are furnished to gear makers and steam and electric shovel manufacturers, a large proportion of these being medium-manganese steel. Builders of rolling-mill machinery, hydraulic and special machinery are obtaining a large quantity of chromium-molybdenum and manganese-molybdenum castings from a Middle West foundry. A small foundry reports that its chromium-nickel, nickel and plain vanadium castings are being sent to seamless tube mills.

Prospects for the Industry

QUITE general is the testimony of several of the reporting companies that the prospects are excellent

for a largely increased production of both alloy steel ingots and castings. This is particularly true in the stainless field, orders for such steel now being very heavy.

It is undoubtedly true that the statistics of the American Iron and Steel Institute do not fully reflect the entire alloy steel production of the country. This is due to some misunderstanding as to just what an alloy steel is. Some contend that where the alloying element is used in only very small proportions, around 0.25 per cent, such as in the case of the carbon-vanadium, carbon-molybdenum and the "copper-bearing" steels, that these are "semi-alloy" steels and should not be included. Some producers of the medium-manganese rail steels, a large amount of which is made each year and the consumption of which is growing, are not included in the statistics of the institute.

A plea for the clarification of this matter is urgently made. While the statistics gathered in the foregoing survey may not coincide in every particular with the data published by the American Iron and Steel Institute, it is felt that they are representative of the industry in general and therefore have some value as indicating trend. Only two or three important producers failed to reply to the questionnaire.

Core Preparation to Improve Castings

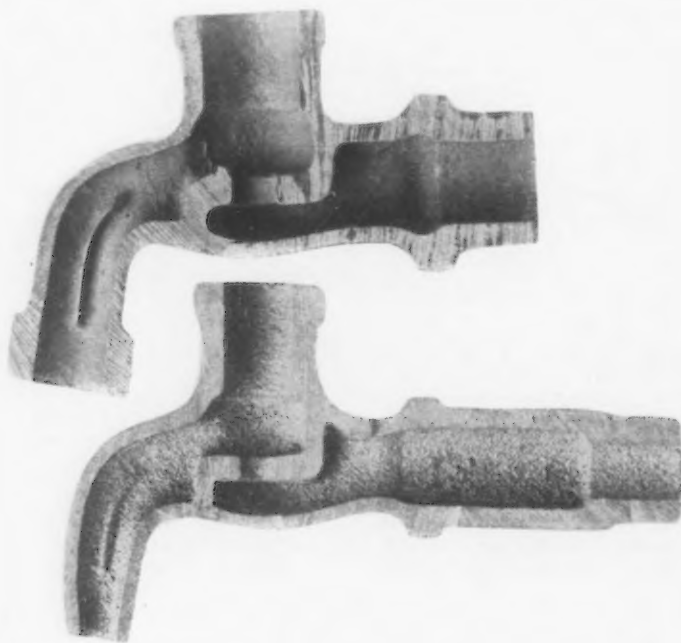
A NEW method of treating cores and molds in the production of castings has been devised by the Sherman Corporation, industrial engineer, 292 Madison Avenue, New York.

The method uses a highly volatile

liquid vehicle diluted with various soluble binders to stiffen the surface filler material, preferably red talc, and the coating may be applied in varying thicknesses, due to infiltration; it dries quickly and is non-inflammable. Thus far the method has been used largely on dry sand cores and molds, and with cores having either a gluten or an oil binder or a

combination of oil and other binders. While the method is particularly useful in brass foundries, due to the cutting-in of the metal into cores and molds, it offers interesting possibilities for ferrous work.

Demonstration has indicated that the work of cleaning castings, through this Sherman core treatment method, is reduced materially, running from 15 to 25 per cent less. Treated cores and molds do not absorb moisture and may be stored indefinitely. Sand blasting of all cored work has been reduced to much less than is required without the treatment.



Casting (Above) Made with Core Treated by the Sherman Method.
By contrast the other was made with an untreated core

Avoiding Lost-Time Accidents

The Carrie blast furnaces at the Homestead Steel Works of the Carnegie Steel Co., Homestead, Pa., were operated from March 2 to Oct. 27, 1929, a period of 238 days, without a single lost-time accident. The average working force during this time was approximately 850 men, and the actual hours worked, 1,772,680.

During this period 1,066,110 tons of pig iron was produced and 94,548 cars were handled, including 36,008 ladles of molten iron and 26,190 ladles of molten slag. W. S. Unger, superintendent of the Carrie furnaces, was recently given the Johnson Award for outstanding blast furnace practice by the American Institute of Mining and Metallurgical Engineers.

Insulated Open-Hearth Furnace Built

Excellent Operating Results Reported for Unit Encased in $\frac{1}{4}$ -In. Plate to Avoid Infiltration—Electrically Controlled Reversing Valve

AFTER 550 heats no repairs have been made on roof ends, front and back walls or checker chambers of a 25-ton open-hearth acid furnace which was designed by the Freyn Engineering Co., Chicago, for operation by the Falk Corporation, Milwaukee. This is an oil-fired unit, which measures 12 x 44 ft. The average fuel consumption, when operating at capacity, is 35 gal. of oil per ton of metal.

Foundations under the checkers, flues and the valve are insulated with approximately 3 in. of Sil-O-Cel C3 furnished by the Celite Products Co., Los Angeles, Cal. In addition to the

Sil-O-Cel, two courses of 9-in. standard firebrick complete the foundation. The checker chambers are encased entirely with $\frac{1}{4}$ -in. steel plates. These chambers are surrounded with an 18-in. wall consisting of $4\frac{1}{2}$ in. of insulating brick C-22, $4\frac{1}{2}$ in. of firebrick and 9 in. of standard silica brick. The insulating brick were brought up to the skewback of the checker chambers. Inside, the checker chambers are 14 ft. 6 in. long and 11 ft. 5 in. wide.

Each chamber roof consists of 3 in. x 6 in. x 12 in. silica brick with 17-in. crown, covered with one course of insulating brick C-22. Each chamber has 17 courses of 9-in. brick, consist-

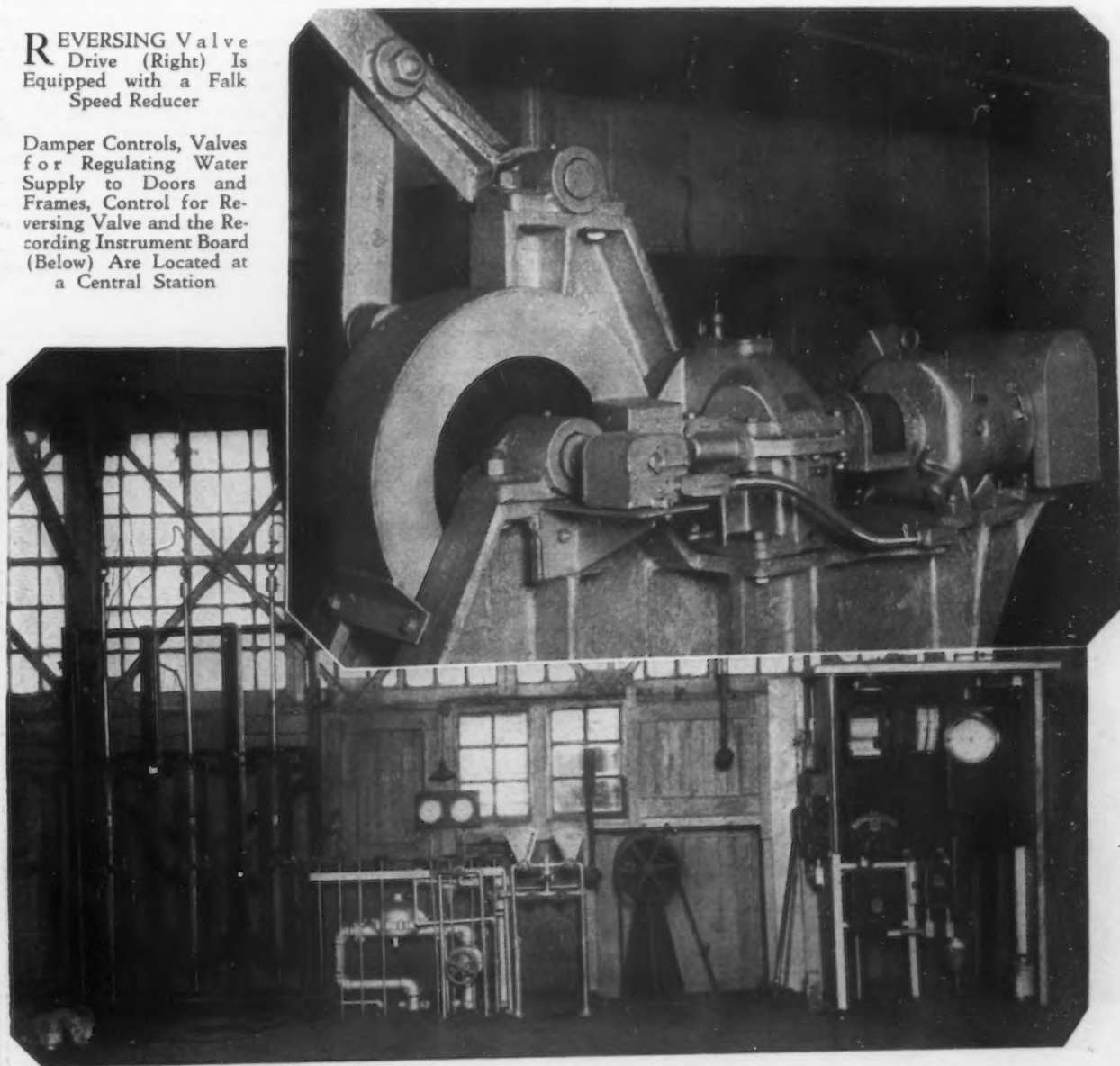
ing of 13 courses of firebrick and four courses of silica brick. Two 5-in. peephole doors with colored glass give the furnacemen a good view into the chamber.

The bath is made up of six courses of brick as follows: one course of insulating C-25 brick running up both ends of the bath pan, two courses of firebrick laid in fire clay, three courses of 9-in. standard silica brick, allowing the usual expansion of $\frac{1}{4}$ in. This gives the bottom a thickness of 15 in. of brick plus 11 in. of silica sand to complete the bath for operation.

Slag pockets and uptakes are encased with $\frac{1}{4}$ -in. steel plate. The

REVERSING Valve Drive (Right) Is Equipped with a Falk Speed Reducer

Damper Controls, Valves for Regulating Water Supply to Doors and Frames, Control for Reversing Valve and the Recording Instrument Board (Below) Are Located at a Central Station





This Furnace Is Encased in a Steel Jacket. The doors and frames are water cooled

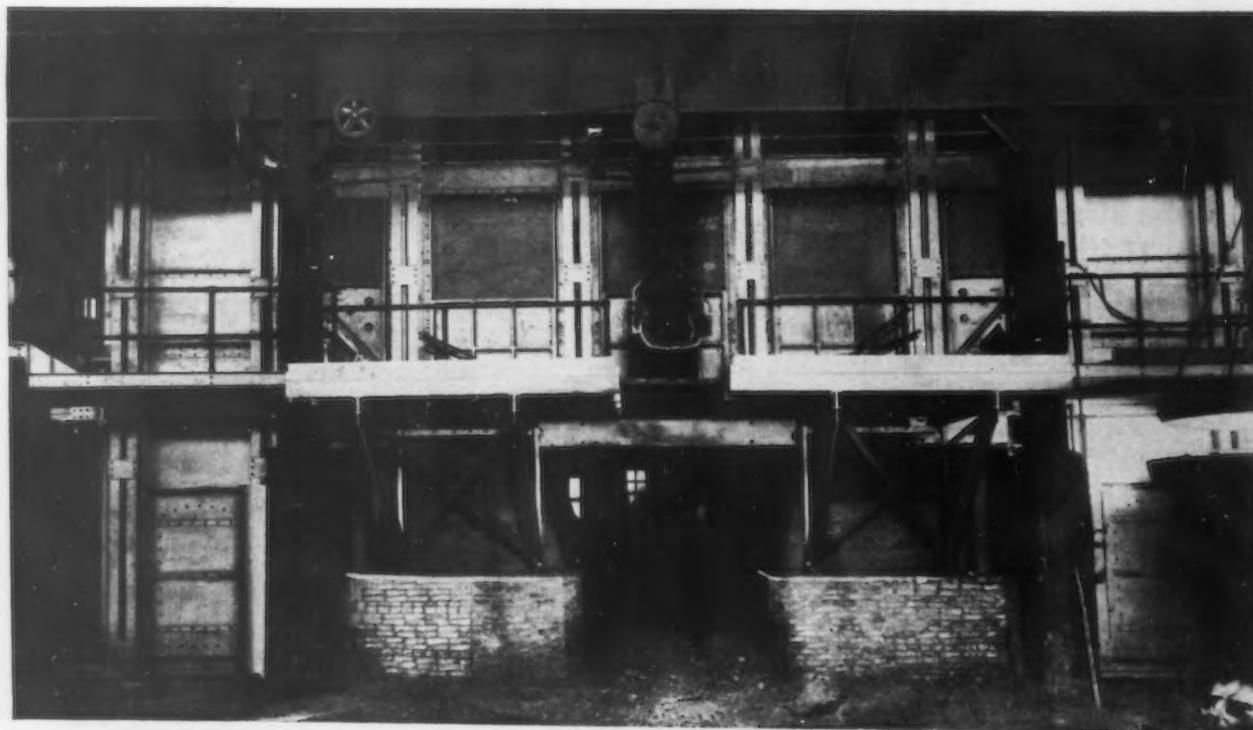
only parts not encased are the ends and part of the backwall. Openings in the uptakes are 41 x 42½ in. The slag pockets are 5 ft. wide. The bulkheads are protected with heavy steel doors lined with Sil-O-Cel 3 cement. The walls, which are 18 in. thick, are lined with silica brick laid in a thin silica cement dip. This method of laying the silica brick provides about 1/32 in. between bricks, plus the usual expansion allowed. Avoidance of infiltration of cold air, in addition to proper insulation, has decreased losses over Sunday shutdowns and has increased the speed of heats.

Among the features of the furnace, the doors have been in service for six months without relining. Water temperature at doors and frames averages 150 deg. Fahr. Three 7-in. diameter x 45-in. stroke air hoists are used to operate the doors, one hoist for each.

A water-cooled Nye reversing valve (rocker type) is entirely electrically controlled from the furnace platform and has a type 5DA Falk speed reducer. Air is furnished by a No. 4 Buffalo duplex conoidal fan with two Timken bearings, mounted on a standard subbase for a direct-connected

motor. The fan is driven by a 5-hp., 230-volt d.c. adjustable-speed shunt-wound motor, having a Falk-Bibby coupling. The motor is controlled from the furnace platform by a d.c. starter.

The damper, inclosed in a steel frame, is controlled from the furnace platform. A gage regulates the height of damper and thus controls the stack draft. A superheater placed in front of the stack damper serves to superheat steam or air for atomizing the oil. This furnace has a recording pyrometer which gives the temperature at the stack damper, an automatic CO₂ recorder, and a draft gage.



The Walls, Which Are 18-In. Thick, are Lined With Silica Brick Laid in a Thin Silica Cement Dip

Opposition to New Duties on Graphite

American Importers, Grinders and Crucible Manufacturers Say Additional Duties Are Needlessly Burdensome Because Local Graphite Is Unsuitable

THE Senate in revising the tariff bill has made a grave mistake in allowing Senator Black of Alabama to enter a clause classifying "crystalline" and "flake graphite" under one head as "crystalline graphite," and placing a 2c. a lb. duty on it, according to a statement by H. M. Riddle, Jr., vice-president, Asbury Graphite Mills, Asbury, N. J.

Since 1922 crystalline graphite has carried a duty of 20 per cent ad valorem and flake graphite a specific duty of 1.5c. a lb. Before that time, graphite carried no duty. The present bill would mean an increase in duty on the highest types of crystalline plumbago from approximately \$29 a ton to around \$44.80 per ton, and on the lowest grade from an average of \$7 per ton to \$44.80, an increase of over 600 per cent.

These figures are opposed by a group of American companies engaged in the importation of graphite, and its grinding (whose spokesman Mr. Riddle is), particularly in view of the fact that American flake is today being offered at lower prices than the foreign product, and also since the increase is more than asked by the company producing 87 per cent of the flake graphite mined in this country in the last three years. In the hearing before the Ways and Means Committee it asked for a continuation of the present duty.

Efforts to Use American Graphite

As American flake graphite does not compete in quality or price with Ceylon or Madagascar graphite, Mr. Riddle's confreres can see no reason for a duty of any kind on this product. Ceylon graphite is of crystalline nature; it comes in several distinct formations which, with different characteristics, are suited for different products. Madagascar graphite, while of flake structure and resembling the American flake, is different in physical characteristics, flake size and structure. For these characteristics, nature itself is responsible. The types have not been found to be interchangeable.

American produced graphite is not an unknown material to any of the industries, neither does it represent a very young industry. It has been on the market for over thirty years and some of the crucible manufacturers and graphite grinders worked with it continually during that time.

It has been claimed by the Southern interests that American graphite has not been used by crucible manufacturers because of antagonism, lack of interest or price. Mr. Riddle states

that all crucible manufacturers have tried to use it and they are today paying approximately 40 per cent more for the highest grade of imported graphite than is asked for the highest grade of American. These manufacturers are producers of crucibles of the highest quality. It is not reasonable to assume that an industry where cost must be kept down would pay this premium unless necessary. Yet a survey of the crucible industry showed that the total amount of domestic graphite used by all crucible manufacturers does not exceed 2 per cent of the total requirements, and this quantity is used in special products only.

The largest stove polish manufacturer in the United States (producing approximately 80 per cent of this country's requirements) and one of the largest users of graphite states "that regardless of the duty placed on imported graphite we will have to continue to use it, because we find it makes a much better stove polish than any domestic graphite."

Properties Required by Manufacturers

In making a graphite foundry facing the material must be pliable, unctuous and yet not claggy (sticky). These qualities are found to the highest degree in the foreign product but which, according to Mr. Riddle, do not appear in domestic graphite, which contains objectionable impurities, is harsh, has no body and is, therefore, unsuitable for foundry facing. In this connection the United States Government in issuing specifications for green sand foundry facing stipulates "Ceylon plumbago."

Several reports issued by the Department of Commerce, Bureau of Mines, shows this unsuitability of domestic graphite. The following is quoted from page 28 of Circular 6118, issued April, 1929:

Some of the amorphous graphite mined in the United States has been nothing more than shale or slate, containing only enough carbonaceous matter to make it black. Other qualities grade into anthracite. Usually it is the physical character of the product that is of utmost importance, and the value of crystalline graphite depends upon its structure and upon the size of the particle quite as much as upon the carbon content. Flake finer than 90 or 100 mesh, for example, is not acceptable to crucible makers, and much larger flake (up to about 12 mesh) is desired.

The following is taken from Circular 6122 of May, 1929:

American graphite deposits, though numerous and often large, are characteristically low grade. They constitute an

abundant source of potential supply, but in normal times they have proved relatively costly to work, and even at the same price, the various products (domestic) never have been able wholly to displace certain imported qualities, notably crucible grades from Ceylon and pencil graphite from Mexico.

That circular has the following to say regarding Alabama graphite:

The rock is largely quartz with some mica and apatite, and with rarely more than three or four per cent graphite. More efficient milling has made possible a 75 per cent recovery from rock containing only 2 per cent of graphite, the yield per ton being about 25 lb. of graphite.

California graphite is treated as follows in the circular:

The smallness of the flake makes it of little value for crucibles and refractories.

Further information is given in Circular 6124 published in May, 1929:

According to one authority, fully 600 graphite mines have failed in the United States, and the records show that of all these properties, scarcely a score have succeeded in operating for as much as a year or two. Throughout the country, in fact, there are scarcely a dozen States in which efforts have not been made at some time to exploit graphite deposits. Failures inevitably occur in all kinds of mining, but the disheartening feature of the record is that so few ventures have paid back the money put into them and none has been a conspicuous success.

The graphite industry, it should be remembered, is in many respects a complicated one. Attempts to state its problems as broad generalities tend to obscure the facts that there are three or four wholly different types of graphite with several grades of each type. Moreover, graphites of nominally the same grade may not be interchangeable because of differences in purity and physical conditions.

Both Alabama and Pennsylvania graphite dust (and flake) were said to be of inferior refractory quality because of their large silica and mica content which fuses under heat.

Further Consideration Urged

The consumers of graphite feel that Congress cannot fully understand this question or they never would burden the country with a duty on a commodity that cannot be produced here. No industry would go half way around the world to Ceylon and Madagascar, carry large stocks of crude material which ties up capital for from six to 12 months, and pay higher prices, if it were possible to use the material found at home. The American importers and grinders are therefore urging a further consideration of this question.

Easy Crane Control by Push Buttons

Accurate Spotting for Riveting Work, Saving in Labor and Increase in Production Reported

ELIMINATION of one man from the working crew and an increase of 25 per cent in output has been accomplished by the installation of a push-button control on a 40-ton riveting crane in the plant of the Lasker Iron Works, Chicago. The crew in this hydraulic riveting tower now numbers three men, including the rivet heater. The essential requirement on this installation was a flexible and delicate control which would quickly spot boiler shells, stack sections and other cylindrical work at 3-in. intervals for riveting in a bull riveter.

Equipment in this tower consists of a 40-ton overhead electric crane, the runway rails of which are 75 ft. above the floor, and three hydraulic riveting machines.

Three separate and independent push-button control stations, one at the control point of each bull riveter, are interlocked in such a way that only one set of push buttons can be used at one time, the others being thrown out of commission by an electric switch. Each push-button station has six push buttons; one for

hoisting, indicating the hoisting direction; one for lowering; one for stopping, and three for first, second and third speeds.

An interesting part of the application is that for inching, or spotting at 3-in. intervals. The first-speed button is touched, after which, by pushing the stop button, the operator is able to stop exactly at the right point. For passing a seam of rivets to the next row, a distance of 2, 3 or possibly 4 ft., the operator uses the second or intermediate speed. For high-speed hoisting, as in normal work, the third or high-speed button is used. Incidentally, the problem of feeding current into the motor when the high-speed button is pushed is taken care of by means of a special control arrangement, whereby the motor is fed from the first or second bank of resistance before going across the line into high speed. This is done automatically by the switch arrangement.

The operation consists of very short movements repeated rapidly. The material to be riveted is spotted for

the first rivet. The motor is then stopped, the rivet is driven in and then the motor is started again to move the material to the desired location for the next rivet and the operation is repeated many times.

How the Results Are Obtained

The motor used is a 60-hp., 220-volt, 3-phase, 60-cycle, slip-ring type, and speed control is obtained by the use of resistance inserted in the secondary winding. The resistance is under the control of magnetic contactors so that the amount in circuit at any one time may be varied and the speed changed accordingly. Three speeds are obtainable.

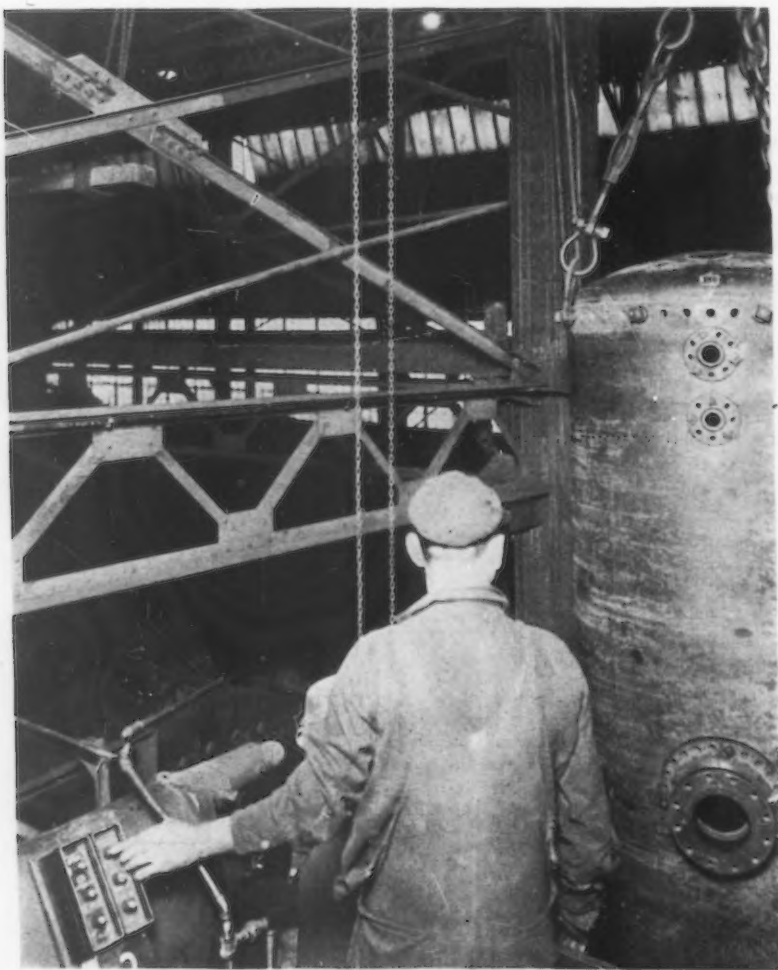
The control panel consists of a pair of three-pole magnetically-operated direction contactors which are mechanically interlocked one against the other, so that it is impossible to close more than one at a time. In addition to these, there are two three-pole magnetically-operated contactors for governing the amount of secondary resistance which is in circuit at any one time. Protection against overloads is secured by the use of a thermal type overload relay. There are also four small control relays used to obtain the proper functioning from the push-button station.

Push-button equipment consists of one push-button station having a forward button, a reverse button and a stop button. There are also five operating stations each consisting of three buttons, one for slow speed, one for intermediate speed and one for high speed. When starting up, the operator selects the direction of travel by pressing either the forward or reverse button. Operation of this button closes one of the directional relays but does not start the motor.

When ready to start, the operator presses one of the speed buttons, depending upon which speed he wishes to select, and the motor then starts and accelerates properly to that speed and no further. If he selects the slow speed, only the directional contactor closes, connecting the motor to the line with all of the secondary resistance in circuit. If he chooses the intermediate speed the directional contactor and one of the secondary contactors close and the motor is connected through a smaller amount of secondary resistance. The high-speed button closes the directional contactor and both of the secondary contactors, connecting the motor to the line with a minimum amount of secondary resistance in circuit. The amount of permanent resistance left in circuit at high speed is quite small and is used only to provide a slight cushioning effect when the motor is started or when load is suddenly thrown on it.

Obtaining Speed Acceleration

Automatic acceleration of the motor is accomplished by the use of timing relays mechanically fastened to the magnetic contactors. One of these relays is used in connection with the forward switch and one with the re-



This Push-Button Crane Control Provides Flexibility in Quickly Spotting Work at a Bull Riveter. Its use has cut labor cost and has increased production

versing switch; the closure of either one will make a circuit for the first resistance contactor. A third timing relay, used in connection with this first resistance contactor, controls the circuit for the second resistance contactor.

It will be noted that it is unnecessary to reach a high speed by first pressing the low speed and intermediate speed buttons. It is only necessary to press the push button for the speed selected and the motor automatically will accelerate to that point. The five speed selecting push buttons are located at different points around

the machine and operation may be secured from any one of them.

Pressure of the stop button will shut down the entire equipment at any time, as will also operation of the overload relay. If a failure in voltage should occur, the equipment will shut down and will not automatically restart. It is necessary for the operator to restart by pressing the push button after a power failure. This control equipment, which was made by Cutler-Hammer, Inc., Milwaukee, was installed by Abell-Howe Co., Chicago, on a specially designed Northern Engineering Works crane.

Builds Smaller Hydraulic-Feed Miller

Machine with 24-in. Table Travel Available in Plain and Duplex Types for High-Production Work

TO the line of Hydromatic milling machines with locked hydraulic feed built by the Cincinnati Milling Machine Co., Cincinnati, has been added a smaller machine designated as the 3-24, with 24-in. table travel. The machine is made in plain and

tiple disk friction clutch and bevel gear reverse mechanism are contained in the spindle reverse unit. The spindle carrier is self-contained, the entire gear transmission, including the spindle speed change gears, being mounted within it. Standard spindle speeds,



THE Hydraulic Feed Unit Is the Same as That Used on the Larger Hydromatics. Any feed from 0 to 40 in. per min. is obtainable; quick traverse is at the rate of 300 in. per min. Plain machines are supplied with either one-way or two-way feed cycles

duplex types. Unit plan of construction is followed, the principal units of the plain machine being the standard No. 3 bed, No. 3 headstock, No. 3 spindle carrier with overarm and two arbor supports, spindle reverse and clutch units, and the hydraulic feed unit. The machines can be supplied with widened and raised headstocks, close-coupled spindle carriers, variable height overhung rail, and bridge-type fixed rail, to meet requirements.

The bed is of semi-steel, is heavily ribbed and has pockets that permit coolant and chips to flow directly inside of the bed. Splash guards serve to confine the coolant within the table area. The spindle carrier unit and the spindle reverse and clutch unit comprise the entire spindle drive. A mul-

eight in number, range from 27 to 200 r.p.m., but high and low series change gears can be supplied. The spindle is carried in a heat-treated 7-in. diameter steel quill that has a cross adjustment of $4\frac{1}{4}$ in., made through a self-locking worm and rack operated by a crank. Other adjustments for setting up the machine are made from the one position at the right of the machine.

The rectangular overarm, mounted on top of the spindle carrier, is of the company's standard design, but new overarm braces are employed. The spindle is mounted on double anti-friction bearings both front and rear, and all gears are of alloy steel and heat-treated. The face gear is 11 in. in diameter by $1\frac{1}{4}$ in. face. The en-

tire spindle drive mechanism is equipped with anti-friction bearings and is lubricated automatically. There are only four gear contacts from cutter to pulley.

The locked hydraulic feed unit, consisting of a variable displacement metering pump, a small booster pump, a gear pump and control valves, forms the closing member of the rear end of the machine bed. This unit is the same as that of the larger Hydromatics described in THE IRON AGE of Dec. 1, 1927. Hand feed changes are made by means of the lever on the feed unit, any feed from 0 to 40 in. per min. being obtainable. Automatic variable feed to suit a varying width or depth of cut is obtainable through a variable-feed attachment, which can be furnished. A positive stop and delayed trip attachment for feeding to a definite depth and dwelling to clean up the cut can also be supplied.

Operating levers are located conveniently at the operating position. The lower lever is used for starting and stopping the spindle. The lever just above it is the table feed directional control lever and has four positions. On the one-way cycle machine, which has feed to the left and quick traverse left and right, there is one position for feed, two for power rapid traverse of 300 in. per min. and a "stop" position. Two-way cycle machines have two positions for feed and two for power rapid traverse. Plain machines are supplied with either one-way or two-way feed cycles, while the duplex machines are offered only with the one-way cycle. A third lever, located at the side of the bed, starts and stops the table without affecting the table cycle.

Automatic control of all table movements, including automatic intermittent feeds, is obtained by dogs. The arrangement includes new type reversing dogs, set on the side of the table, which operate a trip plunger with oscillatory and reciprocating movement that controls the hydraulic feed mechanism. Reversal time of the milling cycle has been considerably reduced, permitting the use of shorter feeding strokes and giving faster production. A large variety of milling cycles can be obtained.

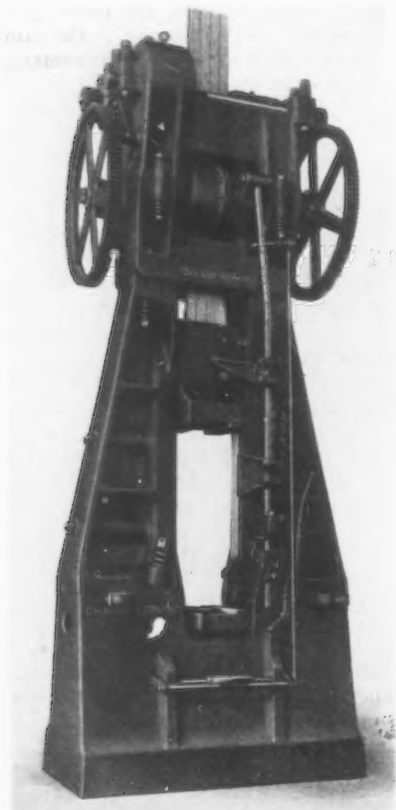
The table of the 3-24 machine has a working surface of 12 x 49 in. The net weight of the plain machine is 5500 lb., and of the duplex, 6500 lb. Machines of the same design but with 30-in. table travel can also be furnished; they are designated as the 3-30 plain or duplex Hydromatic.

An attractive wall chart giving decimal equivalents of wire, letter and fractional size drills; tap drill sizes, and information relating to grinding, feeds and speeds and lubricants has been issued by the National Twist Drill Co., Detroit. The chart is on stiff board, is made in three folds for convenience and has a varnish finish. It is 11 in. wide and 27 in. long.

Board Drop Hammer with Motor-Driven Head

THE new model H board drop hammer built by the Chambersburg Engineering Co., Chambersburg, Pa., is now available equipped with individual motor drive. The motor-

run in oil. A balanced flywheel on the rear shaft serves to protect the motor from variations of load and is capable of operating the hammer for several blows without power. At the



THE Driving Motor Is Spring Mounted and Is Shielded from the Heat of Forging. From the motor the drive is through flexible coupling to the rear roll-shaft, then to the front roll-shaft through herringbone gears. A flywheel is provided between the gears and the coupling of the rear roll-shaft

driven head is identical with the belt-driven head of model H machine, which was described at length in *THE IRON AGE* of Jan. 17, but the motor and driving assembly are mounted on a bracket that replaces the caps over the eccentric bearings. There is but one motor, which is spring mounted and shielded from the heat of forging. The drive to the roll shafts is claimed to provide uniform front and rear roll speed, and eliminate grinding of the boards.

The motor drives the rear roll-shaft through a metal flexible coupling. This shaft drives the front roll drive-shaft by means of a pair of balanced, forged herringbone gears that

opposing ends of the front and rear drive-shafts are non-metallic pinions that mesh with the cut steel gears on the roll-shafts. Movement of the roll-shafts is allowed for by sufficiently large centers between the drive and roll-shafts. All shafts are mounted in Hyatt heavy-duty roller bearings.

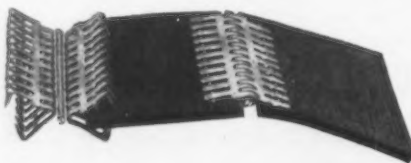
Among other advantages, the individual motor drive permits location to secure continuous flow of material to and from the hammer as well as greater convenience for reheats. Power is used only when forging and hazards are reduced because the hammer is stopped while it is being serviced. There is no hazard from belts, no need for staybraces and less wear on joints.

New Flexible Belt Lacing

FLEXIBLE belt lacing called Steelgrip, for belts from 3/16 to 1/2 in. in thickness and for any belt width, has been placed on the market by Armstrong-Bray & Co., 28 North Clinton Street, Chicago.

This lacing is made of a heat-treated steel which has unusual toughness and high tensile strength but which is hard enough so that the points of the lacing will go through the toughest belting and stand up under long continuous use. The joint of

the lacing is made with a steel rocker pin composed of two segments, one of which rocks against the other and thereby absorbing the wear at the joint when going over the pulley. The lacing can be applied with a hammer to fabric, leather or composition belt-



ing. Being smooth on both sides and flexible, the lacing is adapted for use on idler drives; because of its strength and flexibility it is recommended for use on conveyor belts.

Improved Poole All Metal Flexible Coupling

RECENT improvements in the flexible couplings made by the Poole Engineering & Machine Co., Baltimore, include a combination dust-proof and centrifugal oiling feature obtained by a new type double-flanged end-plate which contains within its inner lip a deep felt packing for the exclusion of dust and dirt. The outer section is grooved and contains back-drain holes which permit lubrication of the coupling while in motion. All parts are heat-treated to rigid specifications to assure longer life and protection against wear.

Few parts and ease of assembly are features of this coupling, which was described at length in *THE IRON AGE* of Jan. 14, 1926. The load is carried on crowned gear teeth, formed on the periphery of each shaft hub, which mesh with corresponding teeth on the interior of a floating and connecting sleeve member. The crowned teeth allow the sleeve to rock and assume the



Improvements Include Centrifugal Oiling and Exclusion of Dust and Dirt

neutral position without binding action as the shafts rotate. The gear teeth are the only parts in contact and are continually submerged in oil under centrifugal pressure while running.

Scovill Mfg. Co. to Issue Bonds for Expansion

The Scovill Mfg. Co., Waterbury, Conn., manufacturer of screw machine products, has called a meeting of stockholders for Dec. 30 to vote on a proposal of the directors to issue \$25,000,000 in 15-year 5 1/2 per cent bonds and \$12,875,000 of common stock to be used for the acquiring of other companies. E. O. Gross, president, has declined to make public the complete plans of the company, but it is said that one or more plants in the Central West are to be bought.

European Markets Affected by Holidays

General Apathy, But British Tin Plate Is Strong and Pig Iron Well Sold—
Japan, Turkey, Egypt, Luxemburg and Germany Figure in News

(By Cablegram)

LONDON, ENGLAND, Dec. 23.

IRON and steel markets are quiet, on account of the approaching holidays, and no revival is expected before the new year. Cleveland furnaces are well placed and few accumulated stocks are anticipated over the holidays, as current unexecuted contracts are still heavy. Hematite furnaces are well sold in both domestic and foreign markets and makers now are reluctant to book first-quarter business except at increased prices.

British steel makers have advanced minimum export prices as follows: Plates, 2s. 6d. (61c.); angles and joists, 5s. (\$1.22); asserting that they are unable to carry the burden of increased costs.

Tin plate markets are strong, with considerable inquiry, but business is slowing down, and all Welsh works will be closed this week.

Galvanized sheets are dull and prices have been reduced in an effort to attract buyers. Black sheets generally are idle.

On the Continent of Europe

Continental markets here are quiet and generally confused, after the European Raw Steel Cartel meetings. Most works are quoting the agreed minimum prices, but buyers assert that they still can obtain concessions from works wanting business.

The International Rail Makers' Association made no change in prices at its meeting on Dec. 13.

French October production was 894,000 (metric) tons of pig iron and

846,000 tons of raw steel. There were 157 blast furnaces active at the end of the month.

German pig iron production in November was 1,091,000 tons.

British Steel Market Is Quiet

Possible Government Transportation Control in London
May Delay Railroad Buying—Steel Making Costs High

LONDON, ENGLAND, Dec. 6.—Business is beginning to show evidence of the usual decline in activity at the end of the year, although the iron and steel industry has not been genuinely active since early fall. Uncertainty as to the Government's intentions with the coal industry, and the unsettled financial conditions throughout the world have contributed toward making both buyers and sellers extremely cautious. In addition, British sellers are still faced with the serious difficulty of meeting severe competition in overseas markets, which has made them rely more upon their home market.

Production costs have shown a steady advance in the past few months, but in most cases producers have refrained from passing these increases on to the buyer. Cleveland pig iron producers are well engaged for the rest of this year and report practically all shipments going di-

rectly into consumption. So far, however, forward contracting has been small and irregular. Large railroad and construction contracts, however, promise some substantial buying of steel-making iron early in the new year.

Purchases for replacement, repairs and expansion of the transportation systems in the London area, such as buses, trams and railroads, may be delayed considerably by the Government's suggestion of a unified control under its supervision.

An example of the increases in costs faced by British producers was recently given by F. J. Rees of the Llanelly Steel Co., president of the Swansea Metal Exchange. At the annual meeting of the exchange, he stated that the Welsh steel makers are paying 50 per cent more for coal than in 1913, about 20 per cent more for pig iron, about 40 per cent more for scrap and 67 to 200 per cent

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.88

British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 12½s. to £3 13½s.	\$17.69 to \$17.93
East Coast hematite...	4 0 to 4 1	19.52 to 19.76
Ferromanganese, export	12 5 to 13 0	59.42 to 63.05
Billets, open-hearth...	6 2½ to 6 5	29.89 to 30.50
Sheet bars, open-hearth	6 0 to 6 5	29.28 to 30.50
Black sheets, Japanese specifications	12 10	61.00
Tin plate, per base box	0 18¾ to 0 19	4.57 to 4.64
Rails, 60 lb. and heavier	7 15 to 8 15	37.59 to 42.43
Cents per Lb.		
Steel bars, open-hearth.	8 0 to 8 10	1.74 to 1.85
Beams, open-hearth...	7 7½ to 7 12½	1.60 to 1.66
Channels, open-hearth...	7 12½ to 7 17½	1.66 to 1.72
Angles, open-hearth...	7 7½ to 7 12½	1.60 to 1.66
Ship plates, open-hearth	7 15 to 8 2½	1.69 to 1.77
Black sheets, No. 24 gage	10 0 to 10 5	2.18 to 2.23
Galvanized sheets, No. 24 gage	12 7½ to 12 10	2.69 to 2.72

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 7s. to £3 11½s.	\$16.35 to \$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3 6 to 3 8	16.11 to 16.59

Billets, Thomas.....	4 11 to 4 12	22.20 to 22.45
Sheet bars, Thomas....	4 11 to 4 13	22.20 to 22.69
Wire rods, low C., No. 5 B.W.G.....	6 3 to 6 5	30.01 to 30.50
Rails, 60 lb. and heavier	6 8½ to 6 10*	31.35 to 31.72
Rails, light	6 1½	29.65
Cents per Lb.		
Steel bars, merchant...	5 5 to 5 6	1.14 to 1.15
Steel bars, deformed...	5 3 to 5 5	1.12 to 1.14
Beams, Thomas, British standard	4 19 to 5 2	1.08 to 1.11
Channels, Thomas, American sections...	5 10 to 5 17	1.19 to 1.27
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 0 to 5 6	1.09 to 1.15
Angles, Thomas, 3-in.	5 6	1.15
Ship plates open-hearth inspected	7 5	1.58
Black sheets, No. 31 gage, Japanese	12 3 to 12 4	2.47 to 2.66
Hoop and strip steel over 6-in. base.....	5 11½ to 5 12½	1.21 to 1.22
Wire, plain, No. 8 gage	7 0	1.52
Wire, galvanized, No. 8 gage	8 10	1.84
Wire, barbed, 4-pt. No. 12 B.W.G.....	11 4 to 11 6	2.44 to 2.46
Wire nails, base.....	0 6¼	\$1.55 per keg
Wire nails, assortments 1 to 6-in. keg.....	10 6½	2.69

*Open-hearth steel, 8s. (\$1.94) per ton extra.

more for other commodities. Handling charges at the docks on imported ore, he said, had increased by 130 to 143 per cent, on pig iron by 110 to 128 per cent and on scrap by 111 to 166 per cent. The average increases in freight rates since 1913 have been about 73 per cent on coal, 69 per cent on pig iron, 40 per cent on scrap and 73 per cent on steel bars. Wage costs on bars have increased 25 to 61 per cent between 1913 and 1929 and the cost of social insurance is at least 300 per cent above the 1913 level.

Cooperative Buying by Wire Rope Makers

HAMBURG, GERMANY, Dec. 9.—A cooperative buying organization of small manufacturers of strand wire and wire rope, the Einkaufs und Interessen G.m.b.H., Essen, has been sufficiently successful to justify its renewal for two years more. The Einkaufs und Interessen acts as buyer of raw materials for about 50 small plants in Germany and, with substantial tonnages to place, is able to obtain lower prices than an individual consumer. Tool makers and manufacturers of bolts and rivets are planning similar cooperative buying organizations.

Japan Expects Decline in Black Sheet Prices

YOKOHAMA, JAPAN, Nov. 27.—Following completion of its No. 2 sheet mill, the Seitetsu-jo at Yawata expects to produce about 5000 tons of electrical sheets next year. Black sheet production in Japan has been delayed somewhat, so that deliveries by the Kawasaki Dockyard Co. are expected to come into the market in volume about next April. Meanwhile, about 10,000 tons of light-gage black sheets are reported to have been bought abroad by trading companies for delivery at about the same time. Recently the Tokio Galvanized Sheet Co. has been quoting lower prices on its brand, and a still lower market is expected in some quarters as spring approaches.

Lower Prices on Wire Rods in Far East

HAMBURG, GERMANY, Dec. 9.—Following a considerable period of stable prices on wire rods for the Far East, keen competition among European makers has brought about a reduction, despite the fact that makers are united in a cartel. Recent quotations, c.i.f. Kobe or Yokohama, have been £7 9s. to £7 11s. per ton, (1.62c. to 1.64c. per lb.), although the official cartel price is £7 13s. 6d. to £7 15s. 6d. per ton (1.67c. to 1.69c. per lb.). Since reports from the Far East indicate that competition from the United States is less marked than earlier in the year, the lower price level is attributable only to European competition.

Second New Furnace Blown in at Arbed Works

HAMBURG, GERMANY, Dec. 9.—The second new blast furnace at the plant of the Acieres Reunies de Burbach-Eich-Dudelange in Luxemburg has been blown in, and a third furnace will be completed and ready for blast in January. The three new furnaces will replace six old ones, which are to be dismantled. The annual capacity of the three new furnaces will exceed that of the six old stacks by about 100,000 metric tons a year.

New Copper Plant Being Built in Germany

HAMBURG, GERMANY, Dec. 9.—The Siemens-Halske A. G. has begun construction of an electrolytic copper plant near here for the Zinnhütte Wilhelmsburg A. G. The new plant will have an annual capacity of 18,000 to 19,000 tons, which should further reduce importation of copper. In the first 10 months of this year 170,650 tons of copper was imported, compared with 197,801 tons in 1928. At the same time exports of copper increased from 16,477 tons in 1928 to 24,920 tons in first ten months of this year.

Chrome Ore Concessions Sought in Turkey

HAMBURG, GERMANY, Dec. 9.—Concessions to operate in the Turkish chrome ore fields are being sought by European companies, including the British Chrome Ore Co., Ltd., and the Société des Forges Françaises. Thus far a Swedish group, the Baschtasch Turk Maaden Shirketi of Angora, Turkey, is the only interest to be given a concession. This company will be permitted to export 16,000 tons of chrome ore annually.

Steel Cartel Retains Curb on Output

WASHINGTON, Dec. 24.—At the meeting of the administrative committee of the International Steel Cartel, held in Düsseldorf, Dec. 14, it was decided to continue to regulate production to market requirements as a part of the agreement to be concluded in the establishment of sales cartels, according to a cablegram from Berlin to the Department of Commerce.

It was also decided to establish an office for distribution of export orders for the principal products of the cartel membership as a preliminary to the formation of the much discussed sales cartels. It is planned to have the office function for six months, beginning Jan. 1, 1930, during which period an extended study will be made of existing international sales cartels, so that necessary changes may be

made before establishing sales groups.

The present production quota, will remain in effect for the first quarter, the actual output being on the basis of 29,058,000 metric tons, or 10 per cent less than the 32,287,000-ton quota in effect prior to the reduction ordered in November. The next meeting of the cartel will be in Paris, March 13.

Wide Range of Bids for Egyptian Rails

HAMBURG, GERMANY, Dec. 9.—Despite the control over rail prices for export that the International Rail Makers' Association is supposed to exercise, a recent opening of bids on 20,000 tons of rails for the Egyptian State Railways brought out a wide variation in prices. Bids were submitted by 10 sellers, including the American Steel Export Co. The contract was placed with David Colville & Sons, Glasgow, Scotland, who received 15,000 tons, and with the Vereinigte Stahlwerke A. G., Düsseldorf, Germany, which was given 5000 tons. The German mill quoted a 2½ per cent lower price than the British maker.

Germany Seeks More Steel Furniture Business

HAMBURG, GERMANY, Dec. 9.—Manufacturers of steel furniture have established a cartel with offices in Berlin and are planning an advertising campaign in Germany to increase the use of their products. A number of manufacturers recently returned from the United States where they studied methods of making steel furniture.

International Wood Screw Cartel Planned

HAMBURG, GERMANY, Dec. 9.—At a recent meeting of British and Continental wood screw manufacturers in Paris, at which American makers were represented, establishment of an international wood screw cartel was discussed. This was the fourth meeting in two years called for such a purpose, but agreement could not be reached. However, a special committee was appointed, which will endeavor to work out a plan upon which all makers can agree.

Reed & Prince Mfg. Co., Worcester, Mass., manufacturer of screw products, has bought the property at 3635 Iron Street, Chicago, with the purpose of increasing its warehouse facilities in that city. The purchase includes a building with about 25,000 sq. ft. of floor space and a tract of land to provide for any further expansion that may be demanded. The Chicago project entails no plans for establishing manufacturing facilities in the Middle West.

This Issue in Brief

Seam welder "stitches" steel plates together to make new battledeck floor. Will strengthen building, lessen dead load, and cut cost.—Page 1721.

* * *

Operating costs in every department are usually reduced when mechanical-handling equipment is installed. Lower handling costs is not the only saving. Benefits are far-reaching.—Page 1721.

* * *

Aluminum alloy sand castings with close tolerances produced with 95 per cent aluminum and 5 per cent silicon. Casts readily and produces sound castings, free from checks and other molding troubles.—Page 1722.

* * *

Uniform hardening is achieved by using two thermocouples, one in the bath and the other within the furnace chamber, each operating a control pyrometer. Excessive temperature changes are prevented.—Page 1726.

* * *

Mass production methods not yet economical in aircraft engine building, but economical arrangement of departments in Wright plant permits adoption of quantity output measures when expansion warrants.—Page 1730.

* * *

Greater speed and accuracy in punching holes in motor bus frames is obtained by use of templets. Templet is clamped to the blank and the holes are punched on a press equipped with a 4-gag punchholder.—Page 1734.

* * *

Turning down of flange on overhead carrying rail is due to peening action. It can be corrected by providing separate wearing surfaces or by using a type of rail which is not distorted by peening.—Page 1734.

Heat-treating costs cut 19 per cent by using electric heat in place of natural gas. Savings in labor, depreciation and repairs offset the considerably lower cost of the gas fuel.—Page 1728.

* * *

Increases output 25 per cent and cuts labor cost by installing push-button control on riveting crane. In steel plate fabricating shop there are three separate control stations, one at control point of each bull riveter.—Page 1740.

* * *

Alloy steel output in 1928 was close to 3,000,000 tons, survey of American industry reveals. Prospects for increased production are excellent.—Page 1736.

* * *

Insulation makes sharp cut in repair bills. Open-hearth acid furnace has run 550 heats with no repairs on roof ends, front and back walls or checker chamber.—Page 1737.

* * *

During hardening operation, shovels are kept down in lead bath by covering it with two-inch layer of powdered coke.—Page 1732.

* * *

Higher graphite tariff unfair and uncalled for, say graphite products manufacturers. Domestic product is already cheaper than imported, and is not used because of inferior quality.—Page 1739.

* * *

Radio testers take their place in assembly line. Traveling belt carries completed sets to testers in sheet steel booths. A signal is made especially for the test.—Page 1720.

Spend money on machining your foundry equipment and you will save money when machining the castings in the machine shop. Government foundry finds it pays to use foundry equipment designed for maximum accuracy.—Page 1722.

* * *

Pattern accuracy is obtained by making saw cuts in thin sections to allow expansion and contraction of members of pattern assembly without affecting the controlling dimensions.—Page 1722.

* * *

Die expense prevented steel auto-bus bodies from competing with wood when only a small number of bodies of a certain design were wanted. But now that the industry is standardizing, multiple production is possible, and all-metal bodies are being made.—Page 1732.

* * *

Radio manufacturer uses a zinc-copper-aluminum alloy for his die castings. Single gas burner melts cold charge in 30 min.—Page 1718.

* * *

Distortion in castings reduced by allowing sufficient time for cooling before shaking out. Heads and gates of aluminum castings are removed by sawing, which is also a distortion preventative.—Page 1724.

* * *

Proper tempering of sand is important in making high-quality aluminum alloy castings. Best results are obtained when sand is worked as dry as practicable, with moisture content never above 6 per cent.—Page 1723.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Calls on the Trade Association

THAT trade associations have won a large place in the scheme of things recent events have proved. When the move was made to mobilize industry and commerce after the first business-alleviating conferences were called by the President, heads of trade associations were selected to form the nucleus of the stabilizing machine.

The big figures of business, in their statements of conditions and prospects, served to remove suspicion that things were really worse than surmised. Now it is desirable to get accurately the succeeding pictures of changes when, and if, they occur. A wide subdivision of industry was wisely regarded as necessary, and the committee of 140 now appointed as the business survey committee is made up almost wholly of the leaders of what may be classed as trade associations.

Each representative is admittedly close to the outlook of his specialty. Through his association he can work to promote a repair, re-equipment and general betterment campaign while financial readjustments are under way and the broad construction programs promised are getting into full swing. For his own group he will probably be expected to report (to the executive committee of 20 in the Washington stabilizing setup) perhaps monthly for a time, respecting new facts bearing on significant changes and trends.

Thus we see a recognition of the trade group as a fact-finding agency and as a working unit for supplying information for industry as a whole. The responsibility is large, for it will not do to color unduly a given situation and again give rise to unwarranted doubts. For the present it does not seem to be the plan that this stabilizing machinery shall operate indefinitely. It may prove too cumbersome, for one thing. Yet how useful it would be if it could attempt to control the business cycle on the uptrend as well as now on the downtrend. To try to check an upswing would clearly be very difficult as well as unpopular, but it is the unbridled expansion that is followed by the depression.

If the lessons of the succeeding weeks prove that cooperative action among trade associations brings concrete results, there may be a demand for a coordinating bureau, say in the Department of Commerce, so that industry may supplement the statistics, which an association makes it a major activity to collect, with dependable information of the human factors that so often overturn the statistical.

The rule of reason respecting applications of the Sherman Law, the depression of 1921 that brought a demand for more economic facts than were hitherto

available, and the group attempts of business to raise its ethical status through the trade practice conferences of the Federal Trade Commission have helped the growth of the trade association immeasurably. The new business stability obligation of the association should also help kindle the association idea where it now lies dead or dormant.

Structural Steel Index Favorable

STATISTICS of the structural steel fabricating shops make an interesting and favorable showing. In steel trade thought these statistics are hardly accorded as large a place as their importance deserves. They represent no inconsiderable part of the total steel made, they are associated with financial conditions, and they are particularly prophetic in several respects.

In the first place, the bookings of the fabricating shops represent steel that is still to be made. In the second place there is work to be done and labor employment to be furnished, after the steel has been fabricated and delivered, while in the case of apartment dwellings, hotels and office buildings the work extends for many months after erection of the steel. Finally, the structures commonly represent long-term investments, entered into with particular care. When there is much construction it is evident that investors take a favorable view of the long-range future.

It is a curious thing that, just as the tightening of money rates a year and half ago began to attract general attention, lettings of fabricated structural steel jobs underwent a sharp increase, and the higher rate was maintained thereafter with scarcely any interruption. The change occurred with May, 1928. Lettings in the four months preceding averaged 241,000 tons a month, while for five months thereafter they ranged well above 300,000 tons. Then, after a partial reversion to the old rate for five months, they made an all-time high record of 358,050 tons last March, and they have been heavy ever since with the exception of last month.

The statistics may be checked in an interesting way against the appearance steel in general presented, of beginning to lose its special activity at just about July 1 of this year. Lettings in the four months after that date were just a trifle above those in the four months preceding—1,386,000 tons against 1,382,150 tons.

This year as a whole is making a record showing by a substantial margin. Only the November lettings were light, and reports thus far this month suggest

that December will do better, but assuming December as merely equal to November, the year's bookings and shipments, of all fabricating shops as indicated by Department of Commerce reports, make the following comparison:

<i>Fabricated Structural Steel—Net Tons</i>		
	Bookings	Shipments
1924	2,640,600	2,669,940
1925	2,980,730	2,998,080
1926	2,894,400	3,214,800
1927	3,052,500	2,853,750
1928	3,287,900	3,126,200
1929*	3,761,450	3,603,600

*December estimated equal to November.

Here is a gain in bookings of more than 14 per cent over 1928, previously the record year, and a gain of 26 per cent over 1925, record in its time.

A comparison of bookings and shipments indicates the relative state of order books. In 1924 and 1925 there was an even break between bookings and shipments, while in 1926 the order book lost. Both last year and this the order book has gained. There is more business on books than one year ago and still more than two years ago, making a very favorable showing for one class of building activity for the opening of the year 1930. Allowing for steel involved in this construction work, but not represented as fabricated structural, in the neighborhood of 10 per cent of the total steel produced in the last few years is accounted for by this activity.

Less Coal and More Power

IN a year of unusual industrial activity, requiring much power, the production of coal is less than in five preceding years, one of them 12 years earlier. This year's coal production may be forecast at an even 600,000,000 tons, made up of about 524,000,000 tons of bituminous and 76,000,000 tons of anthracite. In two war years production was 650,000,000 to 675,000,000 tons, though it must be admitted there were large stocks left. Then in 1920, 1923 and 1926 there was over 650,000,000 tons.

Measured by volume of output our industrial growth has been fairly large since 1913, though not so large in ratio as previously, but as to power requirements that is not all. In nearly every line we use more and more power per unit of output.

If we obtained all our power from coal, and with the same amount of efficiency—or rather inefficiency—as in the old days there would have been a very large increase in coal requirements since 1913. Two things occurred: a much stronger trend toward the economical use of coal and large increases in production of petroleum and natural gas.

The turn that occurred in the production of coal is depicted simply and forcibly by noting periods of time it required for production to double. Starting with 1880, when production of bituminous and anthracite was 71,481,570 net tons, there were doublings approximately as follows: in eight years to 1888, in 13 years to 1901 and in 12 years to 1913, when production was almost precisely eight times that of 1880,

or an average of a doubling in 11 years. From 1913 to 1929, 16 years, there is only about 5 per cent increase.

We can conjecture roughly how much coal has been displaced, so to speak, by increased production of petroleum and natural gas. From 1913 to 1929 the increase in petroleum is roundly about 750,000,000 barrels, with an increase of somewhat over 1200 billion cu. ft. of gas. On a strictly heat-unit basis these increases represent about 170,000,000 tons of bituminous coal in the case of petroleum and about 50,000,000 tons in the case of gas. Not all of the oil and gas is used as substitute for coal, by any means, as witness the automobile in particular, but when so used there is generally more efficiency. We shall be conservatively high if we add the quantities of coal mentioned to this year's actual production, whereupon we find only 44 per cent as the supposititious increase in coal requirements from 1913 to 1929, and a 44 per cent increase in 16 years is quite different from a doubling in 11 years.

We have some indexes as to the pace at which economy in coal production has been proceeding. In nine years covered by actual statistics, 1919 to 1928, the public utilities decreased their coal consumption per unit of current generated by 45 per cent. Also there are data showing that per unit of freight train weight moved the railroads decreased coal consumption about 27 per cent in eight years from 1920 to 1928.

Some coal consumers have progressed more than others, and the others will make progress in future. We are by no means done in introducing economical methods of using coal.

Incidentally one readily sees one great reason why the coal industry has been in such poor shape in recent years, with a large excess of capacity. The previous history of rapid growth fixed the idea that more and more coal mines would be needed. Opening of coal mines had momentum which it took time to dissipate.

Research in a Large and Small Way

OF all the things which visiting industrialists from Europe dwell upon, the ones most often commended are our great organizations for mass production and the integrated business corporations controlling all steps in the manufacture, distribution and sale of their commodities. Our foreign friends, while admiring these activities in the States, almost invariably hasten to assure their countrymen that these conditions are indigenous to the Western continent, and cannot be transplanted to the older civilizations of Europe, where the business structure, the living conditions and the mental habits are so different, saying, "In America, Americans can do things on a grand scale. In England, the English are more individualistic."

This habit we have, over here, of doing things so grandly is not without its disadvantages in certain endeavors—such as fundamental or scientific research, for example. Two cases in point may be cited. A research into the alloys of iron, planned and sponsored by the Engineering Foundation, is waiting until \$150,000 is subscribed before it can move in a large way, for its work so far has been ordered to conserve the

principal sum. American Institute of Mining and Metallurgical Engineers also has in its Seeley W. Mudd Memorial Fund a total of \$200,000, but is endeavoring to multiply it by five in order "to take up a portion at least of the problems now untouched."

Both of these incompleting funds are worthy of the most generous support from the iron and steel industry, and THE IRON AGE is confident that the leading executives in the country have a proper appreciation of the importance of research. However, it is questionable whether such large sums are necessary before a useful start can be made.

Examples of important work steadily carried on with modest finances may be found on both sides of the Atlantic. In England, the Iron and Steel Institute has been able to finance the work of a long line of Carnegie research scholars on the income from a £25,000 endowment, and the younger and smaller Institute of Metals has for several years been financing, by subscription, fundamental work on the corrosion of brass and bronze.

A noteworthy amount of engineering research is also being conducted by various American societies, financed by subscription and volunteer effort. The investigations by the American Welding Society into structural welding, by the American Society for Testing Materials into corrosion, and into the properties of die castings, by the American Society of Mechanical Engineers into heavy-duty bearings and springs—to mention only a few—indicate that we also know how

to get things done by a temporary organization.

All these things are part and parcel of that essential advance in knowledge that President Hoover, some years ago, estimated would cost industry several millions of dollars. American industry cannot afford not to support research generously, for it will lose far more from ignorance than the knowledge gained would cost. To anticipate that manufacturing industry in the United States will not provide funds for future research is to ignore the existence of Dr. Whitney, Dr. Jewett and Dr. Becket. Industrial research laboratories such as theirs number several hundred and the annual maintenance totals many millions.

Furthermore, we are getting ready to do more on these same lines. The United States Steel Corporation has established its central research laboratory; the Batelle Memorial Institute has opened its doors; and the newest steel merger has taken pains to announce that one of its important subsidiaries will be the Republic Research Co.

It sums up to this—a generous amount of provision has already been made for industrial research. A notable amount of cooperative research work is now under way. We have rather more laboratory facilities both in universities and in quasi-public institutions than we have adequate investigators.

Research will go on; it *must* go on; but it will be unfortunate if the development of organization must be hampered long because money facilities are so slow in accumulating.

CORRESPONDENCE

First Steel Coal Breaker

To the Editor: The comment of J. H. Pennington in your issue of Dec. 12, is of unusual interest. When the writer made the statement relative to steel breaker construction in the anthracite field, he was fully informed about the Drifton breaker, but concluded it should not be classed as a steel structure.

The paper presented by Eckley B. Coxe, and referred to by Mr. Pennington, sets forth clearly why this breaker built late in 1889 and early in 1890 cannot be considered as other than an iron structure. Mr. Coxe's paper describes it as follows: "The iron breaker is a pin-connected structure, the posts being of cast iron, the struts generally of cast iron, and the tie rods of wrought iron. Most of the larger beams are riveted plate girders. The smaller are rolled iron."

Structural steel was comparatively a new and untried commodity in 1889, and it is only reasonable to assume that if any steel had been used, Mr. Coxe would have so stated. The paper read before the institute of mining engineers includes a "Bill of material of the more important iron members of the breaker structure." The rolled sections are listed under this caption of "iron members" and no mention of steel is made.

The paper states: "The trussed and riveted girders, the rolled beams and tie rods were made by the Pencoyd Iron Works." Pencoyd continued to roll iron up until 1895, and no doubt the greater portion of its production in 1889 and 1890 was iron. The Phoenix Iron Co. rolled iron almost exclusively until 1893.

The Betz Building in Philadelphia now being dismantled was built in 1893. The "iron work" was furnished by the Phoenix Iron Co., and the dismantling reveals the fact that more than one-half the members were of rolled iron. The columns were steel, but the floor beams, etc., were iron.

The Buck Mountain breaker of the Lehigh Valley Coal Co., built about 1908, is the first steel-frame breaker to prove satisfactory. The structure was designed, fabricated and erected by engineers who gave proper attention to wind bracing to take care of vibration caused by the breaker machinery. This overcame the principal objection to steel-frame breakers; and together with the advent of the H-column, had much to do with the adoption of steel construction for permanent work about the anthracite mines.

FRANK W. JONES,
Philadelphia. Eastern Steel Co.

High-Chromium Steels Best for Roasting Furnace Rabbles

Chromium-iron alloys, low in carbon, are reported to be most suitable for roasting furnace rabbles used for zinc sulphides. In these furnaces, a thin bed of hot ore is rabbled from hearth to hearth by mechanical means. Temperatures reach 1100 deg. C. and atmospheres contain up to 6 per cent SO₂; however, corrosion of these alloys is confined almost exclusively to the "wash line," i.e., at the surface of the bed of fine ore.

Experiments at Port Pirie, South Australia, quoted in *Engineering and Mining Journal*, Nov. 30, indicate that the best alloys contain about 27 per cent chromium, silicon 0.75 per cent, carbon 1.5 per cent or less, and balance iron. Various high chromium-nickel alloys were tried, but the presence of nickel greatly reduced the corrosion resistance under the conditions existing in the furnace.

Western Pipe & Steel Co. Acquires Chicago Company

The Western Pipe & Steel Co. of Illinois has been acquired by the Western Pipe & Steel Co. of California, according to an announcement by officials of the latter corporation. The Illinois company started operations about six years ago and has developed a special line of pressed steel specialties for railroads. One of these specialties is a steel bulkhead for use in refrigerator cars. The company recently acquired 25 acres at Blue Island, Ill., and has completed a modern manufacturing plant. The Western Pipe & Steel Co. of California now operates plants at San Francisco, Los Angeles and Fresno, Cal., and at Phoenix, Ariz.

Wheeling Steel Buys Tyler Tube & Pipe

The Wheeling Steel Corporation, Wheeling, W. Va., has acquired the Tyler Tube & Pipe Co., Washington, Pa., manufacturer of lap-welded boiler tubing and light weight pipe. The company was organized in 1890 and for a long time was prominently identified with the making of charcoal iron tubing. In recent years its principal product has been steel tubing. The executive personnel of the Tyler company will probably be represented on the Wheeling board.

River Movement of Steel Declined in November

Movement of iron and steel products on the Ohio River in the Pittsburgh district during November totaled 88,011 net tons, as compared with 119,129 tons in October, and 137,019 tons in November, 1928, according to the United States Engineer Office, Pittsburgh. Traffic on the Monongahela River totaled 83,189 tons in November, as compared with 119,380 tons the preceding month, and 143,238 in November of last year. On the Allegheny River, 500 tons of steel products was moved in November, compared with 800 tons in the same month last year.

New Machinery Company Formed at Hartford

A group of prominent manufacturers of Hartford, Conn., and Springfield, Mass., have joined in the formation of the Hartford Engineering & Mfg. Co., which will design and build special machinery, in addition to taking over the manufacture of the Whitney hand milling machine, which for many years was built by the Whitney Mfg. Co. of Hartford, and during the past two years by the Young Mfg. Co., same city.

The Hartford Engineering & Mfg. Co. is capitalized at \$100,000. Of-

fices and shops will be located in the building of the Automatic Refrigeration Co. at Laurel Street and Capitol Avenue, Hartford.

John Oakley, vice-president, Perkins Machine & Gear Co., West Springfield, Mass., becomes president of the new company; Frank L. Young, head of the Young Mfg. Co., is vice-president and general manager; Earl C. Abbe, vice-president of the Moore Drop Forging Co., is also a vice-president, and the secretary and treasurer is Earl W. Knight, an engineer of Springfield. Others who are interested in the company are: Clayton R. Burt,

vice-president and general manager, Pratt & Whitney Co., Hartford; Clarence E. Whitney, president, Whitney Mfg. Co., Hartford; Arthur B. Reynders, works manager, and William H. Scherer, superintendent, Westinghouse Electric & Mfg. Co., Springfield; Dr. Edward C. Gilbert, general manager, John J. Duggan, treasurer, and Thomas F. Mahar, sales manager, of the Chapman Valve Co., Indian Orchard, Mass.; Julian N. Perkins, president, Perkins Machine & Gear Co.; William H. Hill, production manager, Curtiss-Wright Airplane Corporation, Paterson, N. J.

The Week in Business

Drift of Current Financial and Economic Opinion

FORECASTS for 1930 are beginning to accumulate. One of the earliest, that of Col. Leonard P. Ayres, of the Cleveland Trust Co., holds that general business next year "will be slower, but not slow, poorer but not poor." Output of iron and steel, he says, will be "distinctly less," the value of building construction "will probably not differ from that of 1929 by more than 5 per cent," and production of motor cars and trucks will fall off between 500,000 and 1,000,000 units — the last incidentally a latitudinous estimate, as it ranges between 9 and 18 per cent.

He expects price of non-agricultural commodities to average below 1929 by less than 5 per cent, industrial wage rates by 3 per cent or less, building costs only slightly under and net profits of industrial companies distinctly so. The year will "start poorly and finish well."

Year-End Consumer Buying

Current holiday retail sales are being watched for the information they may offer in respect to consumer buying power. Preliminary reports are conflicting, so that it is yet impossible to test the contention that a good volume of Christmas trade was certain in spite of the stock market crash, because employment and payrolls have run at a high level since the beginning of the year. Apparently the effect now expected is less expansion in year-end consumer purchasing than would otherwise have been looked for and some contraction possibly later on in 1930.

Another step in the Hoover-planned business-stability program has been taken in the appointment of the Business Survey Conference Committee of 140 by Julius Barnes, chairman of the Washington con-

ference of Dec. 5. The members are to file statements by Dec. 28 covering significant changes and trends not apparent on Dec. 5. Then there will be the decision as to whether or not corrective measures are practicable and necessary. Theodore H. Price, in *Commerce and Finance*, is sure that "a spending campaign has been inaugurated that will provide work for everyone and keep most of our productive facilities fully employed."

Machinery Exports to Japan

Increased exports of machinery are regarded by the Alexander Hamilton Institute as one of the likely happenings following the return of Japan on Jan. 11 to the gold standard for the yen. It is the recent reduction in the Japanese import balance that has worked, among other things, for the removal of the gold embargo.

Use Advertising as in the War

Advertising is offered by several writers as the helpful instrument for bettering the present business situation. And E. E. Calkins, before the Adcraft Club of Detroit, urges a campaign of the scope of those used during the war. He would bring understanding that "it is up to each one of us whether business continues its present satisfying gait or whether it trips up because Wall Street says 'boo'." The Alexander Hamilton Institute expects advertising expenditures in 1930 to exceed 1500 millions of dollars and that magazines will fare rather better in their relative share, as compared with 1929, than the newspapers. The amount of advertising spent in business papers one infers is about \$85,000,000 per annum.

Iron and Steel Markets

Improvement Indicated for January

Some Steel Producers Look for a 75 Per Cent First
Quarter—Structural Awards 90,000 Tons—
Scrap Up 50c. at Pittsburgh

FURTHER increases in specifications from the automobile industry, large awards of fabricated steel, additional strength in scrap and drastic reduction of consumers' stocks are encouraging features of the steel market.

Mill operations have been sharply curtailed, with many units idle for the entire week. Raw steel output will not be cut down proportionately, but the average, counting suspensions, may not be more than 40 per cent of capacity. The rate for December promises to be lower than that for any month, save in the summer of 1924, since the depression of 1921.

The very severity of the fourth quarter decline in production is regarded as the best promise of an early recovery. December's recession in ingot output from November may approximate November's 19 per cent drop from the October rate. The greatest decline in any single previous month was 34 per cent in December, 1907.

The thoroughness with which both manufacturing consumers and warehouses have deflated their steel inventories definitely calls for an improvement in tonnage releases next month. This expectation is borne out by developments at Chicago, where the blocking of shipments by one of the worst blizzards in years was immediately reflected in increased specifications from steel users.

A rush of new business in January is not looked for, since it is realized that many buyers are awaiting further price tests, but betterment is expected in proportion to the damming up of requirements in recent weeks. It is noted that the automobile industry, which has largely passed its inventory period, is continuing to increase its drafts on the mills. First quarter contracts for alloy steel bars have been placed by the largest buyers in the automotive field and fair January bookings from both motor car builders and parts makers have been entered for sheets, strip steel and carbon steel bars. The Ford Motor Co. has made large purchases of automotive accessories and now is understood to be aiming at an output of 125,000 cars next month.

Steel producers are disposed to suspend judgment on the rate of recovery in motor car production until after the January automobile shows, when the reaction of the public can be better appraised. However, steel interests with a diversified trade, and not primarily dependent on business from motor car makers, look for a substantial gain in mill operations, a number of them estimating that their ingot output for the first quarter will average close to 75 per cent.

The confidence of the industry rests partly on a downward revision of production estimates for 1929. It is now clear that total steel ingot output for the

year will exceed the previous record, made in 1928, by not much more than 8 per cent. Pig iron production, which felt the stimulus of steel needs more than last year, will exceed the previous high mark, reached in 1923, by 6 per cent.

The strength manifested by the Pittsburgh scrap market in the past three weeks has crystallized in a 50c. advance in heavy melting steel, the first increase in that grade since Aug. 13. Chicago old material prices are also stronger, partly because of severe weather, with advances registered in several grades. At Philadelphia a mill purchase of 10,000 tons of heavy melting was closed at \$14.50, the previous ruling price. Heavy melting grade at Cleveland, however, has declined 50c. a ton, although market sentiment has improved with the release of shipments by Youngstown, Warren and Canton mills that were taking virtually no scrap two or three weeks ago.

Billets, slabs and sheet bars have undergone a general decline of \$1 a ton to \$34, Pittsburgh or Youngstown. The reduction is mainly a "paper" one, since \$35 was nominal for some time and ruled on very little contract business. Pressure against finished steel prices is still severe, but concessions are not widespread. In some cases mills have shown a willingness to shade on spot business, for example on black sheets, but have remained firm on contract tonnage. Hot-rolled strips and plain wire have also shown weakness.

Beehive furnace coke has declined 5c. a ton to \$2.60, Connellsville, following a shrinkage in demand that has outstripped the curtailment of output.

Structural steel awards, at 90,000 tons, were the second largest for any week this year. This total, coupled with that of 51,000 tons for the previous week, reflects a degree of activity that is unusual for this season. Computed awards for November, at 227,150 tons, showed a sharp drop from the October figure of 350,350 tons, but the total for the 11 months, as reported by the Department of Commerce, was 3,534,300 tons, or nearly 7½ per cent larger than lettings for all of 1928, the previous record year.

Fresh rail orders at Chicago total 20,000 tons, and 100,000 tons additional are expected to be placed by small Western roads soon after the first of the year. Railroad freight cars ordered in 1929 will exceed 100,000, the largest number purchased since 1924.

Lower prices and quantity differentials on low-carbon stainless steel products have been announced by the American Stainless Steel Co.

THE IRON AGE composite prices are unchanged at the year's lowest levels, pig iron at \$18.21 a gross ton and finished steel at 2.362c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
No. 2 fdy., Philadelphia.....	\$20.76	\$20.76	\$21.26	\$21.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	17.69	17.69	17.69	20.19
No. 2, Birmingham.....	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa.....	19.50	19.50	19.75	19.75
Basic, Valley furnace.....	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh..	20.76	20.76	20.76	20.01
Malleable, Chicago*.....	20.00	20.00	20.00	20.00
Malleable, Valley.....	19.00	19.00	19.00	18.00
Gray forge, Pittsburgh.....	19.76	19.76	19.76	18.76
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace....	100.00	100.00	105.00	105.00

Rails, Billets, etc., Per Gross Ton:	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh..	34.00	35.00	35.00	33.00
Sheet bars, Pittsburgh.....	34.00	35.00	35.00	33.00
Slabs, Pittsburgh.....	34.00	35.00	35.00	33.00
Forging billets, Pittsburgh....	39.00	40.00	40.00	38.00
Wire rods, Pittsburgh.....	40.00	40.00	40.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.85	1.85	1.85	1.90

Finished Steel,	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.90	1.90	1.90	1.90
Bars, Chicago.....	2.00	2.00	2.00	2.00
Bars, Cleveland.....	1.90	1.90	1.90	1.90
Bars, New York.....	2.24	2.24	2.24	2.24
Tank plates, Pittsburgh.....	1.90	1.90	1.90	1.90
Tank plates, Chicago.....	2.00	2.00	2.00	2.00
Tank plates, New York.....	2.17 1/2	2.17 1/2	2.17 1/2	2.17 1/2
Structural shapes, Pittsburgh..	1.90	1.90	1.90	1.90
Structural shapes, Chicago....	2.00	2.00	2.00	2.00
Structural shapes, New York...	2.09 1/2	2.09 1/2	2.09 1/2	2.14 1/2
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.20
Hot-rolled strips, Pittsburgh..	1.90	1.90	1.90	1.80
Cold-rolled strips, Pittsburgh.	2.75	2.75	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh...	2.75	2.75	2.75	2.85
Sheets, black, No. 24, Chicago	2.75	2.75	2.85	2.95
dist. mill.....	3.40	3.40	3.40	3.60
Sheets, galv., No. 24, P'gh...	3.50	3.50	3.50	3.70
dist. mill.....	2.35	2.35	2.25	2.20
Sheets, blue, No. 13, P'gh...	2.45	2.45	2.45	2.30
dist. mill.....	2.40	2.40	2.40	2.65
Wire nails, Pittsburgh.....	2.45	2.45	2.45	2.70
Wire nails, Chicago dist. mill.	2.40	2.40	2.40	2.50
Plain wire, Pittsburgh.....	2.45	2.45	2.45	2.55
Plain wire, Chicago dist. mill.	3.05	3.05	3.05	3.30
Barbed wire, galv., P'gh....	3.10	3.10	3.10	3.35
Barbed wire, galv., Chicago	5.35	5.35	5.35	5.25
dist. mill.....				
Tin plate, 100 lb. box, P'gh..				

Old Material, Per Gross Ton:	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Heavy melting steel, P'gh....	\$15.75	\$15.25	\$15.50	\$18.25
Heavy melting steel, Phila....	14.50	14.50	14.50	16.00
Heavy melting steel, Ch'go....	12.50	12.50	12.50	14.50
Carwheels, Chicago.....	13.75	13.50	13.50	14.00
Carwheels, Philadelphia.....	15.50	15.50	15.50	16.50
No. 1 cast, Pittsburgh.....	14.50	14.50	15.00	14.50
No. 1 cast, Philadelphia.....	15.00	15.00	15.50	16.25
No. 1 cast, Ch'go (net ton)...	13.50	13.50	13.50	15.75
No. 1 RR. wrot., Phila.....	15.50	15.50	15.50	15.50
No. 1 RR. wrot., Ch'go (net).	12.00	12.00	12.00	13.25

Coke, Connellsville,	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.60	\$2.65	\$2.65	\$2.75
Foundry coke prompt.....	3.75	3.75	3.75	3.75

Metals,	Dec. 23, 1929	Dec. 17, 1929	Nov. 26, 1929	Dec. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	18.12 1/2	18.12 1/2	18.12 1/2	16.12 1/2
Electrolytic copper, refinery..	17.75	17.75	17.75	15.75
Tin (Straits), New York....	39.50	41.37 1/2	41.62 1/2	49.62 1/2
Zinc, East St. Louis.....	5.45	5.50	6.25	6.35
Zinc, New York.....	5.80	5.85	6.60	6.70
Lead, St. Louis.....	6.10	6.10	6.10	6.35
Lead, New York.....	6.25	6.25	6.25	6.50
Antimony (Asiatic), N. Y....	8.37 1/2	8.50	8.62 1/2	6.75

Pittsburgh

Steel Industry's Forecasts Are for Moderate Recovery in January—Many Idle Mills This Week

PITTSBURGH, Dec. 23.—The holiday week is a period of pronounced inactivity in the Pittsburgh steel trade. Specifications are meager, shipments are light and operations are at a minimum with most mills. Buying is negligible, and companies which had not already closed their first quarter contracts are now inclined to wait until January.

In spite of this, sentiment in the industry continues good, and there are few companies in this district which do not feel that the turn of the year will see a decided change in business conditions. It cannot be denied that consumer inventories are so low that the early weeks of January are certain to see an improvement in tonnage releases. Manufacturers must specify as well as warehouses, because stocks of raw materials at this time are abnormally low. Specifications over the last two months have been only for immediate requirements, and mills have furthered this tendency on the part of buyers by declining to force business.

With the eyes of the industry turned toward future developments, forecasts for the first quarter are receiving considerable attention. There is little doubt that business will show a considerable improvement in January, but whether the trend will continue upward in February and March is a matter to be determined by developments in principal steel consuming lines.

January buying may seem large as compared to that of the last two

months, but it may be confined only to limited requirements, and the remaining months of the first quarter may be characterized by the caution which has persisted in November and December. On the other hand, it would not be surprising to the trade if business increased gradually in February and March, with steel requirements reaching normal proportions early in the second quarter.

During the last two weeks, specifications from the automobile industry

have shown some improvement, but have lacked substantial volume. This activity is undoubtedly prompted by the automobile shows in January, and a continuance of recent orders in increasing volume will depend entirely upon the public's attitude toward buying, as indicated by the shows. Steel operations in Pittsburgh and nearby districts this week are sharply curtailed, and complete suspensions in many departments are reported. Strip mills, which pushed production last week, are largely inactive, and sheet and tin plate departments will not run more than half the week. Open-hearth operations continue very low, with most of the smaller independents operating less than half their furnaces.

Prices show little change, but recent buying has added no strength to the market. Makers of semi-finished steel are now quoting \$34, as compared with the recent \$35 figure, and this decrease has not stimulated first quarter contracting. On the heavy hot-rolled products, the 1.90c., Pittsburgh, price is nominal, as few of the larger buyers have closed first quarter contracts at this figure. Sheet prices are weak, although concessions have not been common enough to warrant lower quotations. It now seems evident that first quarter prices will not be established until the first of the year, and

if buyers continue to press for concessions in nearly all lines of products, mills will have considerable difficulty in holding prices at present levels.

Semi-Finished Steel.—Makers of semi-finished steel in Pittsburgh and Youngstown have finally recognized the \$34 quotation on billets, slabs and sheet bars, which have been made by a Cleveland mill, and are prepared to take contracts for first quarter at this price. This does not represent any particular weakness in the market, as the \$35 price had been nominal for some time, and very little contract business was ever taken at that figure. A few small spot orders have been placed at this price, but by no means a representative part of the tonnage sold. On forging billets, some first quarter business has been taken at \$40, but in some cases such contracts may have to be revised downward, as forging billets ordinarily take a \$5 premium over the rerolling product. Recognition of the lower price has not stimulated business to any great extent, and users of semi-finished steel in this territory are in no hurry to place their first quarter contracts. Wire rods are unchanged at \$40, Pittsburgh or Cleveland, and buyers are slowly placing their usual contract tonnage.

Pig Iron.—Market prospects are brighter, and buyers have clearly indicated in the last week that they are going to need iron in a very short time. The A. M. Byers Co. is said to be sounding out the market for a round tonnage, but is not anxious to place orders at the present quotations. This company will soon begin to buy Bessemer iron for its new Ambridge, Pa., plant, and in the meantime continues to use the foundry grade at Girard, Ohio. The Columbia Radiator Co., McKeesport, Pa., is also thought to be in need of pig iron, although no formal inquiry has been issued. The Westinghouse Electric & Mfg. Co. has not yet closed against its requirements for Trafford City, Pa., and Cleveland. Last week, the Pressed Steel Car Co. bought about 500 tons of foundry iron, which was divided between the Pittsburgh producer and a Valley interest. Shipments are very light. Stocks of iron in consumers' hands are lower than they have been

for several years. In view of this, the leading sellers in the district expect considerable buying in the next few days, although some of them feel that users will continue to place small orders for immediate requirements rather than commit themselves over the entire first quarter at present prices. In the meantime, producers are curbing production. The Shenango Furnace Co. will blow out its remaining active stack tomorrow. This will leave only one merchant furnace in operation in the Valleys and but one in the Pittsburgh district, and bring production to a very low point. Small orders in the last week have been taken at \$18.50, Valley, for foundry and basic iron, and at \$19 for malleable and Bessemer. The local producer continues to quote prices 50c. higher, but Valley makers meet this quotation when coming into the Pittsburgh district.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Bars, Shapes and Plates.—Small users of the heavy hot-rolled products are placing their contract tonnage for the first quarter of 1930, but the larger consumers are somewhat more hesitant. However, the 1.90c., Pittsburgh, price on bars, shapes and plates is holding on the general run of business, and there is every reason to believe that this price will be carried into the first quarter. Operations are holding up fairly well on shapes, but bar mills are running slowly and there is not sufficient tonnage to justify very high schedules in the plate mills. Railroad car builders in this territory will not begin specifying the material required for recent car awards until January, but mills are counting on this tonnage to improve rolling schedules considerably in the early months of the new year. Structural mills are

depending largely upon backlog tonnage at this time, but some new work is coming out. An addition to the Duquesne Club in Pittsburgh will require 1300 tons of shapes. A fair-sized barge order may be placed before the end of the year. A few releases on bars are coming from automobile and parts makers, but the volume of business from this source is still comparatively small. Cold-finishing mills are taking very little steel, and other consuming lines are quiet.

Tubular Goods.—The pipe business is in a quiet season, and shipments have gradually declined during the month. Mill operations are under 50 per cent of capacity, and immediate improvement is not in sight. Makers of mechanical and boiler tubing are not finding tonnage as heavy as it was in November, and of course business is considerably behind the same period of last year. Pipe prices are holding very well in this territory.

Wire Products.—Shipments to jobbers are normally rather light during December on account of inventory, and this year is no exception. Occasional orders for carload lots of nails are reaching local mills, and the urgency for shipment indicates the low stocks of the buyers. Shipments of manufacturers' wire to the automotive and allied industries are about equal to those of November and have shown slight improvement with some companies during the last week. The price is holding at 2.40c. Pittsburgh. On wire nails the \$2.40 to \$2.50, Pittsburgh, quotation is better established than it was, and as business taken at lower prices is cleaned up at the year-end, the market is expected to gain more stability. Annealed fence wire is unchanged at 2.55c. to 2.65c., Pittsburgh.

Stainless Steel Products.—Prices on the low carbon stainless steel products have been reduced and quantity differentials have been set up for large lots, according to an announcement by the American Stainless Steel Co. The reduction reflects the lower quotations on ferrochrome announced a few weeks ago. Under the new classifications, grades of stainless steel containing 0.12 per cent carbon and under are grouped in four ranges, according

THE IRON AGE Composite Prices

Finished Steel

Dec. 23, 1929, 2.362c. a Lb.

One week ago	2.362c.
One month ago	2.362c.
One year ago	2.391c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

High		Low	
1929	2.412c., April 2	2.362c., Oct. 29	
1928	2.391c., Dec. 11	2.314c., Jan. 3	
1927	2.453c., Jan. 4	2.293c., Oct. 25	
1926	2.453c., Jan. 5	2.403c., May 18	
1925	2.560c., Jan. 6	2.396c., Aug. 18	

Pig Iron

Dec. 23, 1929, \$18.21 a Gross Ton

One week ago	\$18.21
One month ago	18.29
One year ago	18.46
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High		Low	
1929	\$18.71, May 14	\$18.21, Dec. 17	
1928	18.59, Nov. 27	17.04, July 24	
1927	19.71, Jan. 4	17.54, Nov. 1	
1926	21.54, Jan. 5	19.46, July 13	
1925	22.50, Jan. 13	18.96, July 7	

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
Del'd Philadelphia.....	2.22c.
Del'd New York.....	2.24c.
Del'd Cleveland.....	1.85c. to 1.90c.
F.o.b. Cleveland.....	1.85c. to 1.90c.
F.o.b. Lackawanna.....	2.00c.
F.o.b. Birmingham.....	2.10c.
C.I.F. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.00c.
F.o.b. Pittsburgh mills, cut lengths.....	2.25c.
F.o.b. Birmingham, mill lengths.....	2.10c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.90c.
F.o.b. Chicago Heights mill.....	1.90c.
Del'd Philadelphia.....	2.27c.

Iron

Common iron, f.o.b. Chicago.....	2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
Del'd Cleveland.....	2.09c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.05c.
F.o.b. Sparrows Point.....	2.00c. to 2.05c.
F.o.b. Lackawanna.....	2.00c. to 2.05c.
Del'd New York.....	2.17½c. to 2.22½c.
C.I.F. Pacific ports.....	2.25c. to 2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c.
F.o.b. Chicago.....	2.00c.
F.o.b. Birmingham.....	2.05c.
F.o.b. Lackawanna.....	2.00c. to 2.05c.
F.o.b. Bethlehem.....	2.00c.
Del'd Cleveland.....	2.09c.
Del'd Philadelphia.....	1.95c. to 2.05c.
Del'd New York.....	2.09½c. to 2.14½c.
C.I.F. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	2.00c.
Wider than 6 in., P'gh.....	1.90c.
6 in. and narrower, Chicago.....	2.10c.
Wider than 6 in., Chicago.....	2.00c.
Cooperage stock, P'gh.....	2.20c.
Cooperage stock, Chicago.....	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.20c.
Bars, f.o.b. Chicago.....	2.20c.
Bars, Cleveland.....	2.20c.
Bars, Buffalo.....	2.20c.
Shafting, ground, f.o.b. mill.....	2.55c. to 3.50c.
Strips, P'gh.....	2.75c.
Strips, Cleveland.....	2.75c.
Strips, del'd Chicago.....	3.05c.
Strips, Worcester.....	2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails.....	\$2.40 to \$2.50
Cement coated nails.....	2.40 to 2.50
Galvanized nails.....	4.40 to 4.50

	Base per Lb.
Polished staples.....	2.85c. to 2.95c.
Galvanized staples.....	3.10c. to 3.20c.
Barbed wire, galvanized.....	3.05c. to 3.15c.
Annealed fence wire.....	2.55c. to 2.65c.
Galvanized wire, No. 9.....	3.00c. to 3.10c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.40c.
Spring wire.....	3.50c.
(Carload lots, f.o.b. Chicago.)	
Wire nails.....	\$2.45 to \$2.55 (keg)
Annealed fence wire.....	2.60c. to 2.70c. (lb.)
Bright hard wire to manufacturing trade.....	2.45c.
Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.	

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.....	\$2.70
Less carloads, Wheeling or Reading.....	2.30

Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.30c.
No. 10, blue annealed, del'd Phila.....	2.42c. to 2.52c.
No. 10, blue annealed, B'ham.....	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh.....	2.35c.
No. 13, f.o.b. Chicago dist.....	2.45c.
No. 13, del'd Philadelphia.....	2.57c. to 2.67c.
No. 13, blue annealed, B'ham.....	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.75c.
No. 24, f.o.b. Chicago dist. mill.....	2.75c. to 2.85c.
No. 24, del'd Philadelphia.....	3.07c.
No. 24, f.o.b. Birmingham.....	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh.....	4.00c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	3.40c. to 3.50c.
No. 24, f.o.b. Chicago dist. mill.....	3.50c. to 3.60c.
No. 24, del'd Cleveland.....	3.59c. to 3.69c.
No. 24, del'd Philadelphia.....	3.72c. to 3.82c.
No. 24, f.o.b. Birmingham.....	3.65c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.00c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	3.90c. to 4.00c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.35
Standard cokes, f.o.b. Gary.....	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.70	25-lb. coating I.C. \$15.90
15-lb. coating I.C. 13.40	30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60	40-lb. coating I.C. 18.80

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. per Lb.	
S.A.E. Series Numbers	Alloy Differential
2000 (¼% Nickel).....	\$0.25
2100 (1¼% Nickel).....	0.5b
2300 (3¼% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (fats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base per 100 Lb.

Spikes, ¾ in. and larger.....	\$2.80
Spikes, ½ in. and smaller.....	2.80
Spikes, boat and barge.....	3.00
Tie plate, steel.....	2.15

Angle bars.....	\$3.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld		Iron	
Steel	Galv.	Black	Galv.
Inches		¼ and ¾ +11	+36
1½.....	45	19½	23
2.....	51	25½	28
2½.....	56	42½	31
3.....	60	48½	31
3½.....	62	50½	35
4.....			
4½.....			
5.....			
5½.....			
6.....			
6½.....			
7.....			
7½.....			
8.....			
8½.....			
9.....			
9½.....			
10.....			
10½.....			
11.....			
11½.....			
12.....			

Lap Weld

2.....	55	43½	23	9
2½.....	59	47½	2½ to 3½	23
3.....	56	43½	4 to 6.....	30
3½.....	54	42½	7 and 8.....	29
4.....	53	40½	9 to 12.....	26

Butt Weld, extra strong, plain ends

¼.....	41	24½	¼ and ¾ +13	+48
½.....	47	30½	½.....	23
¾.....	53	42½	¾.....	28
1.....	58	47½	1 to 2.....	34
1 to 1½.....	60	49½		
2 to 3.....	61	50½		

Lap Weld, extra strong, plain ends

2.....	53	42½	¼.....	29
2½.....	57	46½	2½ to 4.....	34
3.....	56	45½	4 to 6.....	33
3½.....	52	39½	7 and 8.....	31
4.....	45	32½	9 to 12.....	21
4½.....	44	31½		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in.....	1½ in.....
2½ in.—3 in.....	1¾ in.....
3 in.....	2 in.—2½ in.....
3½ in.—4 in.....	2½ in.—3 in.....
4 in.....	3 in.....
4½ in. to 6 in.....	3½ in. to 4 in.....
	4 in.....
	4½ in.....

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.....	61
1½ to 1¾ in.....	53
1¾ in.....	57
2 to 2½ in.....	52
2½ to 3 in.....	40

Hot Rolled

2 and 2½ in.....	58
2½ and 3 in.....	46
3 in.....	52
3½ to 4 in.....	54
4 to 4½ in.....	57
4½, 5 and 6 in.....	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base (carloads).....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 16 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

to their percentage of chrome, namely, 15 per cent and under, 15 to 18 per cent inclusive, 18 to 23 per cent and 23 to 30 per cent. Formerly, chrome percentages were arranged in three groups. On stainless cold-rolled strips, the reduction amounts to 6c. a 100 lb., while the prices of stainless steel sheets are about 5 per cent less. Quantity differentials will amount to $\frac{1}{2}$ c. a lb. on lots of 10,000 to 36,000 lb. in single shipment orders of one size, and 1c. a lb. on lots of more than 36,000 lb. The base price, with usual extras, applies to orders of 2000 to 10,000 lb. of bars, billets and tube rounds, and 5000 to 10,000 lb. of sheets, plates and strip.

Sheets.—Sheet mill operations were slightly higher with most companies last week than they were in the first half of the month, but this week will see complete cessation of activities in many plants and production will drop to the lowest point of the year. As specifications have been improving a bit in the last few days, fairly good schedules are expected next week and the improvement will likely be carried into January. The trend of operations after that depends largely upon the automobile industry, which has not yet definitely committed itself on the volume of tonnage it will require in the first quarter. Other consuming lines are taking only small tonnages and in most cases shipments are rush. This leads to costly mill schedule, as some companies are forced to start up mills for very short runs in order to serve customers whom they do not wish to disappoint. Prices are generally unchanged. A large percentage of customers have placed their first quarter contracts at the present quotations, but this percentage does not include many of the large buyers who are still pressing for price concessions. In the last week one or two, mills have expressed their willingness

to take business for immediate rolling at concessions in order to fill out operating schedules, but such mills would not take contract business at lower prices. On black sheets, the 2.75c., Pittsburgh, price is holding in most cases, while galvanized sheets are selling at 3.40c. to 3.50c, the higher price applying only on small tonnages. Blue annealed sheet and light plates are still quotable at 2.35c. and 2.20c., Pittsburgh, respectively, so far as jobbing mills are concerned, while companies making this material on wide strip mills are quoting \$2 to \$4 a ton less.

Tin Plate.—Mill operations last week were rather high, averaging from 60 to 80 per cent of capacity in this and nearby districts, but this week nearly all the tin mills have suspended operations entirely. However, specifications are gradually improving, and schedules will be higher in January.

Strip Steel.—Specifications are somewhat better, although generally for small tonnages on which shipments are deferred until January. Operations were heavier last week, although the industry as a whole is not running at more than 40 per cent of capacity. This week complete suspensions are in effect in a number of mills, but sufficient tonnage releases are expected to accumulate to provide a fair rate of operations the week following. Smaller buyers are under contract for first quarter at the full prices, but larger consumers are still holding off and one or two of them insist that quotations lower than 1.90c. and 2c., Pittsburgh, on hot-rolled strip have been made. On cold-rolled material, a price of 2.65c., Pittsburgh or Cleveland, has been mentioned in connection with a few sales to tubing manufacturers, but the 2.75c. quotation is holding on the general run of orders.

Cold-Finished Steel Bars.—Business shows a slight improvement, but December shipments are going to be very light. The most encouraging thing about the market is the price, which is holding well at 2.20c., Pittsburgh. Specifications from farm implement makers served by this district are in fair volume, but other consuming lines are taking little steel.

Coke.—The furnace coke market is distinctly weaker, and the \$2.65, Connelville, price no longer applies to much business. Production has not declined as rapidly as demand, and many sellers are very anxious to dispose of surplus tonnage. At present no sales at less than \$2.60 have been reported, but sales would be made at less, and the market will possibly decline to lower levels. Heating coke is moving considerably better as a result of recent cold weather, but the foundry grade is very dull and shipments have practically ceased for the next week or two. Prices are weak and only nominal in the absence of significant buying.

Old Material.—The scrap market retains its renewed strength, and a recent sale of No. 1 heavy melting steel is said to have been made at \$16. At least one or two dealers are willing to pay \$15.50 or more for this grade, and, as this was the last price paid by a mill in this district, there is every reason to believe that the scrap market has advanced 50c. a ton and is now quotable at \$15.50 to \$16, delivered at local consumers' yards. Hydraulic compressed sheets are unchanged, but the No. 2 heavy melting steel grade is stronger, and the sentiment in the market is temporarily optimistic. The scrap market may be expected to gain strength even though steel mill operations are no higher, as the establishment of a fairly steady rate eliminates the uncertainty brought about by holdups in a declining market. In the opinion of some dealers, scrap may advance rather sharply in January, while others believe that present conditions do not suggest anything more than a gradual upward trend in quotations. Specialties are still strong, while the lighter grades, such as machine shop and blast furnace turnings, are unchanged in a listless market.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel.	\$15.50 to \$16.00
No. 2 heavy melting steel.	14.00 to 14.50
Scrap rails	14.00 to 14.50
Compressed sheet steel	15.00 to 15.50
Bundled sheets, sides and ends	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
Sheet bar crops, ordinary	18.00 to 18.50
Heavy breakable cast	11.00 to 11.50
No. 2 railroad wrought	15.50 to 16.00
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	10.00 to 10.50

Acid Open-Hearth Grades:

Railr. knuckles and couplers	20.00 to 20.50
Railr. coil and leaf springs	20.00 to 20.50
Roller steel wheels	20.00 to 20.50
Low phos. billet and bloom ends	20.50 to 21.00
Low phos., mill plates	20.50 to 21.00
Low phos., light grades	19.50 to 20.50
Low phos., sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	14.00 to 14.50

Electric Furnace Grades:

Low phos., punchings	18.50 to 19.00
Hvy. steel axle turnings	14.00 to 14.50

Blast Furnace Grades:

Short shoveling steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.50 to 11.00
Cast iron borings	10.50 to 11.00

Rolling Mill Grades:

Steel car axles	19.50 to 20.50
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Cupola Grades:

No. 1 cast	14.00 to 15.00
Rails 3 ft. and under	17.50 to 18.50

Warehouse Prices, f.o.b. Pittsburgh

	Base per lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.70c. to 3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.35c. to 4.45c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c. to 3.35c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c. to 3.50c.
Galv. corrug. sheets (No. 28), per square	\$4.33
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'd, base per 100 lb.	\$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per keg	2.80 to 2.90
Cement coated nails, per keg	2.95 to 3.05

Youngstown

Improvement in Steel in January Expected

YOUNGSTOWN, Dec. 23.—There is a growing feeling of optimism in the iron and steel trade of northeastern Ohio that conditions will show substantial improvement after the turn of the year. Sales departments report that inquiries are more numerous and that orders have been received the last 10 days in larger numbers and for larger tonnage. Hence, an upturn in schedules after the holiday season is expected.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel					
Billets and Blooms		Sheet Bars		Skelp	
Per Gross Ton		(Open Hearth or Bessemer)		(F.o.b. Pittsburgh or Youngstown)	
Perolling, 4-in. and under 10-in., Pittsburgh	\$34.00	Pittsburgh	Per Gross Ton \$34.00	Grooved	Per Lb. 1.85c. to 1.90c.
Perolling, 4-in. and under 10-in., Youngstown	34.00	Youngstown	34.00	Universal	1.85c. to 1.90c.
Perolling, 4-in. and under 10-in., Cleveland	34.00	Cleveland	34.00	Sheared	1.85c. to 1.90c.
Slabs					
(8 in. x 2 in. and under 10 in. x 10 in.)					
Perolling, 4-in. and under 10-in., Chicago	36.00	Pittsburgh	Per Gross Ton \$34.00	Wire Rods (Common soft, base)	
Forging quality, Pittsburgh	40.00	Youngstown	34.00	Pittsburgh	Per Gross Ton \$40.00
		Cleveland	34.00	Cleveland	40.00
				Chicago	41.00

Prices of Raw Material

Ores

*Lake Superior Ores, Delivered Lower
Lake Ports*

	<i>Per Gross Ton</i>
Old range Bessemer, 51.50% iron.....	\$4.80
Old range non-Bessemer, 51.50% iron.....	4.65
Mesabi Bessemer, 51.50% iron.....	4.65
Mesabi non-Bessemer, 51.50% iron.....	4.50
High phosphorus, 51.50% iron.....	4.40
 <i>Foreign Ore, c.i.f. Philadelphia or Baltimore</i> 	
	<i>Per Unit</i>
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian.....	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus.....	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%.....	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$15.50 to \$16.50
 <i>Per Gross Ton</i> 	
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
 <i>Per Lb.</i> 	
Molybdenum ore, 85% concentrates of MoS ₃ , delivered	50c. to 55c.

Ferromanganese	
	<i>Per Gross Ton</i>
Domestic, 80%, seaboard.....	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00
Spiegeleisen	
	<i>Per Gross Ton Furnace</i>
Domestic, 19 to 21%.....	\$31.00 to \$34.00
Domestic, 16 to 19%.....	29.00 to 32.00
Electric Ferrosilicon	
	<i>Per Gross Ton Delivered</i>
50%	\$85.50
75%	130.00
<i>Per Gross Ton</i>	<i>Per Gross Ton</i>
Furnace	Furnace
10%	\$35.00
11%	37.00
12%	\$39.00
14 to 16%.....	45.00

Fluxes and Refractories		
Finorspar	Per Net Ton	
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines.....	\$18.00	
No. 2 lump, Illinois and Kentucky mines..	20.00	
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.25 to 18.75	
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines.....	\$2.50	
Fire Clay Brick		
	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	
	Intermediate Heavy Duty Brick	
Pennsylvania ...	\$42.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 55.00
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Coke		Per Net Ton
Furnace, f.o.b. Connellsville prompt		\$2.60 to \$2.75
Foundry, f.o.b. Connellsville prompt		3.75 to 4.75
Foundry, by-product, Ch'go ovens		8.00
Foundry, by-product, New England, del'd		11.00
Foundry, by-product, Newark or Jersey City, delivered		9.00 to 9.40
Foundry, by-product, Phila.		9.00
Foundry, Birmingham		5.00
Foundry, by-product, St. Louis, f.o.b. ovens		8.00
Foundry by-prod., del'd St. Louis		9.00
Coal		Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines		\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines		1.50 to 1.75
Gas coal, ¼-in. f.o.b. Pa. mines		1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines		1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines		80c. to 90c.
Gas slack, f.o.b. W. Pa. mines		1.00 to 1.10

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	<i>Per Gross Ton</i>		<i>Per Gross Ton</i>	
6%	...\$22.00 to \$23.00		...\$26.00 to \$28.00	
7%	... 23.00 to 24.00		... 28.00 to 30.00	
8%	... 24.00 to 25.00		... 30.00 to 32.00	
9%	... 25.00 to 26.00			

Other Ferroalloys

Ferrotungsten, per lb. contained metal	
del'd	\$1.40 to \$1.50
Ferrochromium, 4 to 6% carbon and up,	
65 to 70% Cr., per lb. contained Cr.	
delivered, in carloads	11.00c.
Fervovanadium, per lb. contained vana-	
dium, f.o.b. furnace	\$8.15 to \$3.85
Ferrocobaltititanium, 15 to 18%, per net	
ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric	
material, in carloads, 18%, Rockdale,	
Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric	
24%, f.o.b. An-	
niston, Ala., per gross ton	\$122.50

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	<i>Per Cent Off List</i>
†Machine bolts	70
†Carriage bolts	70
†lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads.....	70
Hot-pressed nuts, blank or tapped, square....	70
Hot-pressed nuts, blank or tapped, hexagons....	70
C.p.e. and t. square or hex. nuts, blank or tapped	70
Washers*	70c. to 6.75c. per lb. off list

	<i>Per Cent Off List</i>
Semi-finished hexagon nuts.....	70
Semi-finished hexagon castellated nuts, S.A.E.....	70
Stove bolts in packages, P'gh.....	75, 20, 10 and 5
Stove bolts in packages, Chicago.....	75, 20, 10 and 5
Stove bolts in packages, Cleveland.....	75, 20, 10 and 5
Stove bolts in bulk, P'gh.....	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago.....	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland.....	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

(7/8-in. and smaller)	
	<i>Per Cent Off List</i>
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

(Freight allowed up to but not exceeding 50c.
per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws.....	80, 10 and 5
Milled standard set screws, case hardened.....	80 and 5
Milled headless set screws, cut thread.....	75 and 10
Upset hex. head cap screws, U.S.S. thread.....	85
Upset hex. cap screws, S.A.E. thread.....	85
Upset set screws.....	80, 10 and 5
Milled studs.....	80

Large Rivets	
(½-in. and larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland.....	\$3.10
F.o.b. Chicago	3.20

Chicago

Western Storms, Delaying Steel Shipments, Bring Larger Orders From Consumers Whose Stocks Are Low

CHICAGO, Dec. 23.—Shipments of finished steel from Chicago mills have been curtailed as a result of severe winter weather which not only has hindered mill transport departments but also has handicapped railroads in switch yards and on mail lines.

This situation has worked hardships on some manufacturing consumers of steel, who have permitted their stocks to run exceedingly low. In order to better cover their needs, many consumers are sending in increased specifications to the mills, and in many instances instructions for prompt shipment are included. As a result, specifications exceed shipments for the first time in many weeks. New buying also is heavier, with the total reaching close to the current rate of shipments.

Chicago mills will shut down this week only for the 24-hr. period of Christmas Day. Ingot output ranges from 60 to 65 per cent of capacity. Twenty-two of the 36 steel company blast furnaces in the district are active.

With transportation digging its way out from under ice and snow, it can reasonably be expected that the drop in output due to the holiday will be offset by the freer movement of cars in mill yards and on the railroads.

Car shops continue to take liberal quantities of steel. Shipments of plates to the Milwaukee pipe maker are expanding.

It is computed here that for the country as a whole more than 100,000 cars have been ordered this year and that about 75 per cent of these have been placed in Western shops.

Orders for structural material continue to expand from a wide territory surrounding Chicago. Public utility programs are well under way, with contracts placed this week for three large additions to power plants in the Middle West.

Pig Iron.—Although shipments of Northern pig iron are dropping as the holidays approach, there is the encouraging feature of this market that fresh inquiries are growing rapidly, and buying for the first quarter shows marked improvement. Requests for prices indicate that 5000 to 10,000 tons will be placed at an early date. The local Southern iron market is quiet, with most quotations at \$13.50 a ton, Birmingham. Quotations on silvery remain mixed, a local user having been offered a small tonnage of the 15 per cent grade at \$38.50 a ton, Jackson County furnace. The local charcoal iron market is quoted at \$24, furnace, on a large part of current sales, but prices are quite frequently named near \$20 a ton to a widening circle of so-called non-users.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25...	\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75...	20.50
Malleable, not over 2.25 sil.....	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50.....	27.04
So'th'n No. 2 fdy. (all rail)..\$19.01 to	19.51
Low phos., sil. 1 to 2, copper free..	29.50
Silvery, sil. 8 per cent....\$28.79 to	29.79
Bess. ferro-silicon, 14-15 per cent...	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—A small lot of resale spiegeleisen is being offered here at \$29 a ton, Hazard, Pa. The ferromanganese market is quiet except for the signing of a few contracts which have been slow in being brought to a close. A Middle Western user has closed for 500 tons of 25 to 30 per cent of ferro-silicon.

Bolts, Nuts and Rivets.—This industry continues to produce between 55 and 60 per cent of capacity. Stocks in the hands of most users and distributors are of moderate size, as indicated by the frequency of orders. Quite a number of first quarter contracts have still to be signed by consumers, many of whom have not acted as quickly in this respect as has been their custom in previous years.

Plates.—Local plate mill operations are steady, with satisfactory schedules for shipment to the pipe maker and car shops. A Western oil refiner is in the market for 4000 tons of tank plates, and two gas holders in San Francisco will take 2500 tons. Recent surveys made in the West forecast a satisfactory volume of business to be placed in 1930 by oil producers and operators of gas and oil lines.

Bars.—Specifications from manufacturers of automobiles for mild steel bars, as well as alloy steel bars, show some improvement. Mild steel is moving in larger quantities to builders of farm machinery which are under way with harvesting machinery production programs. Releases by road

machinery makers are smaller, but this is looked on as a seasonal condition, as their order books are of good size. Local rail steel bar mills continue to operate on a double turn basis, but incoming orders are light and backlogs are measurably smaller. Most users are pressing for deliveries, which can be made in about one week.

Structural Material.—Structural awards in the week total nearly 10,000 tons, of which fully 8000 tons is for four power plants being constructed by public utility companies. Of special note is the 3500 tons needed for the addition to the Waukegan, Ill., central station of the Public Service Co. of Northern Illinois. Fresh inquiry is for 1500 tons, in which is included steel for additions to two power plants. Shop schedules for the Illinois Steel Co.'s expansion program are growing rapidly, and some fabricated steel on these orders has been shipped to erection sites.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Sheets.—This market is quiet, as is usual at this time of the year. Many consuming plants which are closing down for the holiday week are placing business for delivery after Jan. 1. Jobbers report distribution light and, as a result, their replacement-of-stock orders from mills are at the low point of the month. Output is holding this week at 60 per cent of capacity. The hot mills at Milwaukee are down for the remainder of the year, but orders for future delivery are accumulating and it now seems probable that these units will start to operate in the first week in January. Forward buying, even in view of small stocks in the hands of consumers, has been disappointing to sellers. In the absence of buying that would afford real tests, prices are steady at 2.80 to 2.90c. a lb., delivered, Chicago, for black sheets; 3.55 to 3.65c. for galvanized sheets, and 2.35c. for the blue annealed product. Deliveries are prompt on all classes of sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c. to 2.90c.; No. 24 galv., 3.55c. to 3.65c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Semi-Finished Steel.—The local market is quiet in both sales and shipments. Rerolling billets, 4 in. and under 10 in., Chicago, are quoted \$36 a gross ton, Chicago.

Hot-Rolled Strip.—Mill schedules are a trifle heavier as specifications grow, principally from manufacturers of automobile frames. Prices are steady at 2.10c. a lb., Chicago, for strips 6 in. and narrower.

Cold-Rolled Strip.—New orders, both of future and spot character, are affording encouragement to producers of cold-rolled strip. Because of larger releases, output is growing, the average now being about 30 per cent of capacity. Deliveries are prompt.

Wire Products.—Winter weather, which, in recent days, has blanketed most of the country, has served as an

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel..1.95c. to	2.10c.
Reinforc'g bars, rail steel.....	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Plats and squares.....	4.10c.
Bands (3/4 in. in Nos. 10 and 12	
gages).....	3.20c.
Hoops (No. 14 gage and lighter)..	3.75c.
Black sheets (No. 24).....	4.05c.
Galv. sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes, 3/4 in. and larger.....	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
Per Cent Off List	
Machine bolts	60
Carriage bolts	60
Coach or lag screws.....	60
Hot-pressed nuts, sq., tap, or blank...	60
Hot-pressed nuts, hex., tap, or blank..	60
No. 8 black ann'l'd wire, per 100 lb..	\$3.45
Com. wire nails, base per keg..\$2.75 to	2.95
Cement c't'd nails, base per	
keg	2.75 to 2.95

effective check to a growth in orders which was under way in the early days of last week. Storms have delayed mail and also have checked outdoor work. Although there is some enlargement in demands for wire by automobile parts makers, the pickup is less than the trade had hoped for earlier in the month: Wire mill stocks have been growing for many weeks and have reached the point where producers wish to hold them for the winter months. Accordingly, operations have been revised downward, the range now being 40 and 50 per cent of capacity. Western wire mills expect to close down for two days during the holiday period. Specifications for wire nails are in satisfactory volume, considering the time of the year. Much of this business is for prompt delivery, giving further evidence of the small size of stocks in jobbers' and dealers' hands.

Cast Iron Pipe.—St. Louis has closed for 50,000 ft. of 8-in. and 20,000 ft. of 6-in. pipe with the American Cast Iron Pipe Co., and 30,000 ft. of 12-in. and 10,000 ft. of 20-in. with the United States Pipe & Foundry Co. The latter order was for class B pipe and it was taken at \$35.50 a ton, Birmingham. The freight rate to St. Louis is \$5.58 a ton, bringing the delivered price to \$41.08. This business was placed for immediate delivery. Detroit has closed for about 6500 tons of pipe with the Lynchburg Foundry Co. and the United States Pipe & Foundry Co. It is reported that prices did not hold in view of competition with foreign-made pipe. The quantities ordered were 1500 tons of 24-in., 2160 tons of 36-in., and 2900 tons of 42-in. Franklin County, Ohio, was to have taken bids Dec. 15 at Columbus on 15,000 ft. of 6 and 8-in. pipe. It is reported here that awards have been indefinitely postponed. James B. Clow & Sons have taken 200 tons of 8-in. pipe for Chicago. Several public utility companies have made inquiries for blanket prices on tonnages that are to be determined later. Among these is the United Gas Improvement Co.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$43.70 to \$45.70; 4-in., \$47.70 to \$49.70; Class A and gas pipe, \$3 extra.

Old Material.—The Chicago scrap market is gaining in strength, as indicated by the breadth of inquiries and the attitude of most brokers. Another indication is that railroads find bidding against offered lists to be more active, with resultant higher prices. The nearness of the end of the year causes most buyers to place orders for delivery after Jan. 1, but here and there urgent requests for prompt delivery are made by users who had underestimated nearby needs. One of the most severe blizzards in years has seriously handicapped preparation and loading of scrap in local yards. Switching facilities have been taxed to the limit and many delays in deliveries have occurred. This situation is a market factor and is readily used by sellers to support their contentions that consumers will pay higher prices. As to the extent to which the upward movement

will go, there is little that can be said at this time. Most brokers, while looking for higher levels, do not anticipate that advances will be over a wide range. Dealers do not hesitate to pay \$13 a gross ton, delivered, for heavy melting steel to be applied against old orders, and there is reason to believe that some brokers are going long of the market in this and several other heavy-tonnage grades. Visible supplies of cast iron borings have dwindled and, though users have offered \$9.50 a ton, delivered, they have found no takers among sellers, who are paying \$10 a ton for tonnages to apply against old orders and who wish to gain a long position in the market. The Santa Fe obtained \$13.75 a gross ton, delivered, on a recent sale of heavy melting steel. Country scrap is still blocked from Chicago by low prices, curtailed melt and the strictness of inspections.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:

Heavy melting steel.....	\$12.50 to \$13.00
Shoveling steel.....	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.00 to 11.50
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling.....	11.00 to 11.50
Forg'd cast and r'd steel carwheels.....	17.50 to 18.00
Railroad tires, charg. box size.....	17.50 to 18.00
Railroad leaf springs cut apart.....	17.50 to 18.00

Acid Open-Hearth Grades:

Steel couplers and knuckles	16.00 to 16.50
Coil springs.....	18.00 to 18.50

Electric Furnace Grades:

Axle turnings.....	12.75 to 13.25
Low phos. punchings.....	15.00 to 15.50
Low phos. plates, 12 in. and under.....	15.00 to 15.50

Blast Furnace Grades:

Axle turnings.....	10.50 to 11.00
Cast iron borings.....	9.25 to 9.75
Short shoveling turnings.....	9.25 to 9.75
Machine shop turnings.....	7.00 to 7.50

Rolling Mill Grades:

Iron rails.....	14.50 to 15.00
Rerolling rails.....	14.50 to 15.00

Cupola Grades:

Steel rails less than 3 ft..	16.50 to 17.50
Steel rails less than 2 ft..	18.50 to 19.00
Angle bars, steel.....	15.25 to 15.75
Cast iron carwheels.....	13.75 to 14.25

Malleable Grades:

Railroad.....	16.25 to 16.75
Agricultural.....	14.50 to 15.00

Miscellaneous:

*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:

Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms.....	17.50 to 18.00
Iron car axles.....	25.50 to 26.00
Steel car axles.....	15.75 to 16.25
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	11.00 to 11.50
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	7.00 to 7.50
Locomotive tires, smooth..	14.50 to 15.00
Pipes and flues.....	9.50 to 10.00

Cupola Grades:

No. 1 machinery cast.....	13.50 to 14.00
No. 1 railroad cast.....	12.50 to 13.00
No. 1 agricultural cast.....	12.00 to 12.50
Stove plate.....	10.50 to 11.00
Grate bars.....	10.75 to 11.25
Brake shoes.....	10.50 to 11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Rails and Track Supplies.—Three purchases of rails, two of which were by railroads and one by a manufacturer of frogs and switches, total 20,-

000 tons. A week ago it was estimated that small Western railroads would place 100,000 tons of rails soon after the first of the year. Fresh inquiries have augmented this figure, so that, even with this week's purchases, there still remains, according to estimates of local producers, more than 100,000 tons which will be added to books in the early part of the new year. The New York Central has closed for 14,000 tons of track accessories. Although it is known that a large tonnage is to be taken to accompany recent rail orders, none of this business is definitely before the trade. Rail mill output remains at the high rate reached several weeks ago. Track accessory departments continue to hold at a moderate rate of output. The light rail market is quiet.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Coke.—Shipments of by-product foundry coke are somewhat lighter, as most foundries plan to close down the last week in the month. However, production remains at the full capacity of local ovens. Prices are steady at \$8 a ton, f.o.b. Chicago ovens, and \$8.75 a ton, delivered in Chicago.

Reinforcing Bars.—Cold weather is cutting deeply into shipments of reinforcing bars from Chicago warehouses. Backlogs continue to dwindle, but the measurement of deliveries is taken more on the score of contractors' ability to place steel at this time of the year rather than by the size and number of orders placed. Shop operations are not above 30 per cent of capacity. Prices are still at the low point of the year, with only slight improvement in prospect on small tonnages of billet steel reinforcing bars. Estimators are busy on a fair amount of new business. The University of Illinois will build a new chemistry building at Urbana, Ill. School buildings in Chicago promise a substantial tonnage early in the new year.

Norton Co. Opens New Cleveland Building

The Norton Co., Worcester, Mass., has opened a new service building in Cleveland, at 1306 East Fifty-fifth Street, where all divisions of the company will have their district headquarters. This is the third district building opened by the Norton Co. within three years; the others are at Philadelphia and Detroit. The Cleveland building, a two-story structure, 100 x 140 ft., contains offices, a truing room, service department and store rooms for stocks of grinding wheels. The Cleveland district personnel of the company will be enlarged, but A. R. Sandine remains in charge of the grinding wheel division and M. E. Mattson continues as sales manager of the grinding machine division. The Cleveland Tool & Supply Co., 1427 West Sixth Street, Cleveland, continues as agent.

New York

50,000 Tons of Structural Steel for Empire State Building Awarded—Pig Iron Sales 8500 Tons

NEW YORK, Dec. 23.—Pig iron sales at 8500 tons, again represented an encouraging total in view of the inclusion of a considerable number of small lots. It is evident that, while most melters are not ready to commit themselves very far ahead, they must cover for their nearby requirements. Unshipped tonnage that will be carried over into 1930 will probably be below normal, since forward contracting has been light and there have been few suspensions of deliveries against past commitments. Some buyers will have enough iron to last them through the first quarter, but as a rule carryover tonnage will not last foundries through January. Many continue to buy spot iron for their closeby needs. Pending business in the market exceeds 10,000 tons. The General Electric Co. is inquiring for nearly 5000 tons, including 1150 tons for Bayway, N. J., 1000 tons for Pittsfield and Lynn, Mass., 700 tons for Schenectady, N. Y., and 2000 tons or more for other plants. The Eastern Malleable Iron Co., Bridgeport, Conn., is in the market for 1500 tons of foundry and malleable. The inquiry for the Worthington Pump & Machinery Corporation for 825 tons is still unsatisfied. Many foundries are shut down in the current week for inventories, but the outlook is for no further recession in melt than has recently occurred. Some of the manufacturers of radiators and domestic furnaces have suffered more than the usual seasonal slump, but electrical equipment and heavy machinery makers continue active. Prices on Southern iron for delivery in this section have been unaffected by the 50c. advance in the Alabama market, and prices on Northern brands are unchanged, although possibly more flexible than heretofore.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	\$21.91 to \$22.41
*Buff. No. 2, del'd east.	
N. J.	20.28 to 20.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Finished Steel.—Interest has centered on structural steel, which continues unusually active despite the proximity of the Christmas holidays. Contracts placed in the New York metropolitan area in the past week will require close to 70,000 tons of steel, of which about 50,000 tons will go into the Empire State Building at Fifth Avenue and Thirty-fourth Street on the former site of the Waldorf-Astoria Hotel. This job was let on Friday, Dec. 20, to the American Bridge Co. The exact tonnage which

it will take is not known, since plans have not been completed. However, it is safe to say that it will be in the neighborhood of 50,000 tons, which puts it among the largest awards on record. A subway section needing 6800 tons of steel was another sizable letting of the past week. Action is expected soon on 17,800 tons of steel for an elevated section of the municipal subway in Brooklyn. Apartment construction is proceeding at a rapid rate in New York and a substantial amount of the tonnage awarded in the last month has been for that type of work. Aside from structural steel, the market reflects the dullness incident to the holiday season and to the inventory period. Orders and specifications have been light, and little improvement is expected until the second week of January. Sheet steel bookings have been of fair volume for this time of the year, while wire goods are sluggish. Bars and plates are moving slowly. Prices have not changed.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.17½c. to 2.22½c.; structural shapes, 2.09½c. to 2.14½c.; bar iron, 2.14c.

Cast Iron Pipe.—A moderate tonnage of pressure pipe is being inquired for, but awards are not expected until after the first of the year. Contractors' bids for a sewage disposal plant requiring about 150 tons of 48-in. pipe and fittings have been opened by the Westchester County Sewage Commission, but no award has been announced. Sizable tonnages of gas pipe are pending for the United Gas Improvement Co., Philadelphia, and the American Construction & Securities Co., New York, and water pipe for the Federal Water Supply Co., New York. Prices of pipe continue irregular and lacking in firmness, with most foundries in need of tonnage.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$34.60 to \$36.60; 4-in. and 5-in., \$37.60 to \$39.60; 3-in., \$44.60 to \$46.60. Class A and gas pipe \$3 extra.

Reinforcing Bars.—The volume of business this month has dropped off sharply from the level maintained in November. There is a moderate amount of pending work, but almost all of it has been held up until early in January. Meanwhile, prices are steady and unchanged.

Warehouse Business.—December has been a decidedly quiet month, with considerably less business than a year ago. Galvanized sheet prices, which began to develop a tendency to weakness about a week ago, have been placed on a quantity differential basis, effective Dec. 21, so that No. 24 gage is quoted at 4.50c. a lb., for lots of less than 50 bundles and 4.25c. a lb., base, on orders for 50 bundles or more.

Coke.—Shipments have held up very well, although affected during the current week by plant shutdowns. Stand-

ard furnace coke ranges from \$2.65 to \$2.75 a net ton, Connellsville. By-product foundry coke is quoted at \$9 to \$9.40, Newark or Jersey City, and \$10.06, New York or Brooklyn. Special grades of beehive foundry coke still bring \$4.85, Connellsville, or \$8.56, delivered Jersey City or Newark, and \$9.44, New York or Brooklyn.

Warehouse Prices, f.o.b. New York

Base per Lb.	
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.50c.
Flats and squares.....	4.00c.
Cold-roll, strip, soft and quarter	
hard.....	5.15c. to 5.40c.
Hoops.....	4.25c.
Bands.....	3.75c.
Blue ann'l'd sheets (No. 10).....	3.25c. to 3.90c.
Long terme sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger.....	3.40c.
Smooth finish, 1 to 2 ½ x ¼ in.	
and larger.....	3.75c.
Open-hearth spring steel, bases,	
4.50c. to 7.00c.	
Per Cent Off List	
Machine bolts, cut threads:	
¾ x 6 in. and smaller.....	60
1 x 30 in. and smaller.....	50 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	60
¾ x 20 in. and smaller.....	50 to 50 and 10
Coach Screws:	
¾ x 6 in. and smaller.....	60
1 x 6 in. and smaller.....	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe		
Standard Steel—	Black	Galv.
½-in. butt.....	46	29
¾-in. butt.....	51	37
1-3-in. butt.....	53	39
2 ½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12
Wrought Iron—		
½-in. butt.....	5	+19
¾-in. butt.....	11	+9
1-1 ½-in. butt.....	14	+6
2-in. lap.....	5	+14
3-6-in. lap.....	11	+6
7-12-in. lap.....	3	+16

Tin Plate (14 x 20 in.)		
	Prime	Seconds
Coke, 100 lb. base box....	\$6.45	\$6.20
Charcoal, per Box—	A	AAA
IC.....	\$9.70	\$12.10
IX.....	12.00	14.25
IXX.....	13.90	16.00

Terne Plate (14 x 20 in.)	
IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R.	
One Pass	
Per Lb.	
Nos. 18 to 20.....	3.70c.
No. 22.....	3.85c.
No. 24.....	3.90c.
No. 26.....	4.00c.
No. 28*	4.15c.
No. 30.....	4.40c.

Sheets, Galvanized	
Per Lb.	
No. 14.....	4.15c.
No. 16.....	4.00c.
No. 18.....	4.15c.
No. 20.....	4.25c.
No. 22.....	4.35c.
No. 24†.....	4.50c.
No. 26.....	4.75c.
No. 28*.....	5.00c.
No. 30.....	5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

†For 50 bundles or more, 25c. per 100 lb. less.

Old Material.—Consumer buying of scrap has practically ceased, except for offers made in a few cases to buy at 50c. a ton less than the current quotation. A mill at Claymont, Del., which recently closed on about 5000 tons of No. 1 heavy melting steel at \$14.50 a ton, delivered, is not in the market for further material, but has expressed willingness to consider purchases of No. 1 steel at \$14 a ton. Other grades are decidedly inactive and No. 2 heavy melting steel prices show no increasing strength, despite offers of \$14.50 a ton, delivered to a western Pennsylvania plant, by brokers with contracts. This is equivalent to \$9.20 a ton, New York, while \$8 a ton, New York, is the maximum offered for No. 2 steel for delivery to eastern Pennsylvania consumers.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel.	\$10.50 to \$11.35
Heavy melting steel (yard)	7.50 to 8.00
No. 1 hvy. breakable cast.	10.00 to 10.50
Stove plate (steel works)	8.00
Locomotive grate bars	8.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.25 to 7.50
Cast borings (blast fur.	
or steel works)	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.25 to 16.25
Iron car axles	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to 9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought	11.50 to 12.50
No. 1 yard wrought, long	10.50 to 11.50
Rails for rolling	10.50 to 11.00
Stove plate (foundry)	8.25 to 8.50
Malleable cast (railroad)	12.50 to 13.00
Cast borings (chemical)	8.50 to 9.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Three Materials Handling Companies Merge

The Barrett-Cravens Co. and the Walker Vehicle Co., both of Chicago, and the Automatic Transportation Co., Buffalo, have been merged. All are manufacturers of materials handling equipment. The Walker Vehicle Co., a subsidiary of the Commonwealth Edison Co., Chicago, is one of the oldest truck manufacturers. The Barrett-Cravens Co. manufactures lift trucks, platforms, portable elevators and structural steel storage racks. The Automatic Transportation Co. is one of the pioneer manufacturers of electric industrial trucks and tractors.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 14 in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

Cleveland

Automobile Manufacturers Order Steel More Freely and Some Mills Increase Rolling Operations Slightly

CLEVELAND, Dec. 23.—Demand for finished steel from the automotive industry shows a considerable increase, mills having received during the week fairly good orders from some of the automobile manufacturers and parts makers for sheets, strip steel and steel bars. This business has enabled a few plants to further increase operations in their finishing departments to 50 per cent or more of capacity. Demand for steel from other consumers is light but fully as good as it was earlier in the month. As the inventory period is at hand, most consumers are paring their orders to a minimum in order to have stocks as low as possible on Jan. 1.

Several motor car manufacturers are lining up their steel requirements with a view of getting in production on new models or increasing their output of present models in January. The output of cars next month will show a considerable gain over that of December. The Ford Motor Co., which is planning a heavy production during the early months of the year, has placed some large orders with parts makers. It is understood that the Ford company aims to get its production up to 125,000 cars during January. Contracts for first quarter requirements of alloy steel bars have been placed by the two largest buyers of that steel in the automotive field. This industry has not done much contracting for the quarter for other steel products, most of the orders being for January requirements.

While some pressure for price concessions is coming from the automotive industry, mills report that automobile manufacturers generally appear satisfied with the continuation of the fourth quarter prices.

Pig Iron.—Considerable inquiry for first quarter contracts in lots up to 500 tons came out during the week. Sales were light and not much business is expected before the first of the year. The General Electric Co., which sent out a small inquiry recently, has put out an additional inquiry for several thousand tons for its various plants. Many foundries have shut down until after the holidays and have cut off on shipments. However, the decline in shipping orders this month has been less with some furnaces than expected because of releases that have come from some of the automotive foundries. Prices appear to be firmly maintained at \$18.50, Cleveland, for foundry and malleable iron for out-of-town shipment and \$19, furnace, for Cleveland delivery. In eastern Michigan, \$20 furnace is being well maintained, but in the western part of the State \$19.50 is rather commonly quoted.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., sil. 1.75 to 2.25	\$19.51 to 20.51
Malleable	19.50
Ohio silvery, 8 per cent	23.00
Basic Valley furnace	18.50
Stand. low phos., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore.—The consumption of Lake Superior ore during November amounted to 4,700,925 tons, as compared with 5,365,813 tons in October, a decrease of 664,888 tons. In November, last year, the amount used was 4,897,404 tons. Furnace stocks Dec. 1 were 35,010,075 tons. The amount at furnaces and Lake Erie docks Dec. 1 was 41,499,687 tons, as compared with 40,080,106 tons on the same date a year ago. Central district furnaces consumed 2,263,513 tons in November, a decrease of 451,657 tons for the month. Lake front furnaces consumed 2,211,220 tons, a loss of 206,901 tons. Eastern furnaces used 115,302 tons, a decrease of 5404 tons, and all-rail furnaces used 110,890 tons, a decrease of 926 tons. There were 155 furnaces in blast using Lake ore Nov. 30, a loss of 25 for the month.

Semi-Finished Steel.—Specifications for sheet bars show a further slight gain, as some of the mills that cater to the automotive industry are getting busier. While a local mill has opened its books for first quarter contracts for sheet bars, billets and slabs at \$34, Cleveland, consumers are as yet showing no interest in future commitments and no contracts have been closed. Considerable tonnage covered by fourth quarter contract will be carried over to the next quarter.

Wire Products.—There is considerable pressure for concessions on wire and, while there are reports of a 2.30c., Cleveland, price, the regular 2.40c. quotation appears to be well maintained. Nails are firm at \$2.40 a keg. Orders are very light, as is usual at this time of year.

Sheets.—Orders for good-sized lots for January requirements were placed by the automotive industry in the Michigan territory during the week. These permitted some of the mills to increase operations. Several mills have shut down for the holidays. While there has been pressure for concessions on automobile body sheets in Michigan, if there has been any shading it has been exceptional. Prices on blue annealed sheets are still somewhat irregular. Black sheets are well maintained at 2.75c., Pittsburgh, and galvanized sheets are holding at a minimum of 3.40c.

Strip Steel.—Mills have taken some fair-sized orders from the automobile manufacturers in the Detroit terri-

tory, and several makers are operating their hot mills better than last week. Demand in the territory continues slow. Although prices on hot-rolled strip are holding fairly well, some round lot buyers appear to be able to secure concessions. Cold-rolled strip is firm at 2.75c., Cleveland.

Bars, Plates and Shapes.—There has been a moderate increase in steel bar specifications from the automotive industry, some for immediate delivery and some for shipment in January. Orders for small lots of plates show a slight gain. A local mill this week took several hundred tons from a locomotive manufacturer. While some bar business has been taken at 1.85c., Cleveland, and even as low as 1.80c. for a large tonnage, outside mills generally are holding to a 1.90c. base and have closed contracts at that price. One outside mill is naming 1.87½c., delivered, for Cleveland business. A number of consumers have closed first quarter contracts for plates and structural shapes at 1.90c., Pittsburgh. Reports of a 1.90c., Cleveland, price on plates are denied. While inquiry in the structural field is light, considerable building work is in prospect for the early part of the year.

Coke.—Ohio by-product foundry coke has been reestablished at \$8.25, ovens, for January shipment. The demand is very light, as many foundries will be closed down the remainder of the month for inventories. Buying is of a hand-to-mouth character.

Old Material.—Sentiment in the market shows an improvement, and there is a little more activity than around the first of the month. This is

probably due largely to the fact that mills in Youngstown, Warren and Canton, which were taking virtually no scrap two or three weeks ago, have released some shipments. Prices show a weak tone, although there is not enough business to offer a real test. No. 1 heavy melting steel is down about 50c. a ton. As high as \$9.65 is being offered for machine shop turnings for shipment before the end of the month. Blast furnace scrap has declined about 25c. a ton. Dealers are now offering \$9.50 to \$10 for these grades. No. 1 cast scrap has declined 75c. a ton. A sale of forging crops is reported at \$18.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.	\$13.50 to \$14.00
No. 2 heavy melting steel.	13.00 to 13.50
Compressed sheet steel.	12.50 to 13.00
Light bundled sheet stampings	11.50 to 12.00
Drop forge flashings.	11.50 to 12.00
Machine shop turnings.	9.00 to 9.50
Short shoveling turnings.	11.00 to 11.50
No. 1 railroad wrought.	13.00 to 13.50
No. 2 railroad wrought.	14.00 to 14.50
No. 1 busheling.	12.00 to 12.50
Pipes and flues.	9.00 to 9.50
Steel axle turnings.	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops.	17.75 to 18.00
Low phos., billet, bloom and slab crops.	18.50 to 18.75
Low phos., sheet bar crops.	18.00 to 18.50
Low phos., plate scrap.	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings.	9.75 to 10.00
Mixed borings and short turnings.	9.75 to 10.00
No. 2 busheling.	9.75 to 10.00
Cupola Grades:	
No. 1 cast.	15.25 to 15.75
Railroad grate bars.	11.00 to 12.00
Stove plate.	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Railroad malleable.	18.00 to 18.50
Rails for rolling.	16.25 to 16.50

Philadelphia

Steel and Pig Iron Contracting Small—Mills and Consumers Closing Over Holidays

PHILADELPHIA, Dec. 23.—Steel mills and many manufacturing consumers of steel in this district are closing over the holiday period for a few days to a week. Buying has declined, and deliveries of pig iron and steel are generally being postponed until after Jan. 1. Steel contracting for first quarter has been limited, most buyers preferring to wait until the new year before purchasing. Prices show no further recession, and are being maintained more firmly on quotations for first quarter contracts than on small tonnages bought for delivery during the next 30 days.

Pig Iron.—Contracting for first quarter has covered only a small percentage of foundry iron requirements, most consumers preferring to cover their needs a carload at a time until their business develops a definite trend and prices show more firmness. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., which recently bought a small tonnage of foundry iron, has asked for prices on two carloads to be delivered before Dec. 31. The American Engineering Co., Philadelphia, is inquiring for about 1000 tons of various grades. This company inquired for a similar tonnage in August, but later abandoned the inquiry and covered its requirements as they arose. With buying light during the present month

and with numerous postponements of deliveries until the new year, furnaces in the district have been accumulating some iron on their yards.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.76 to \$21.76
East. Pa. No. 2, 2.25 to 2.75 sil.	21.26 to 22.26
East. Pa. No. 1X.	21.72 to 22.76
Basic (del'd east. Pa.)	19.50 to 19.75
Gray forge	20.00 to 20.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. br'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—Contracts have been renewed in a few cases for the next quarter, with the price firm at 1.90c. a lb., Pittsburgh, or 2.22c., delivered Philadelphia.

Reinforcing Bars.—A moderate tonnage of bars has been inquired for in the past week, the Eighth Street subway, Philadelphia, requiring 750 tons and the Henry Avenue bridge, Philadelphia, on which new bids are being taken, about 600 tons. A small tonnage will be used in contract No. 7 of the Pennsylvania terminal improvement. Prices are unchanged, with billet steel bars at 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia, and the extra for cutting to length usually omitted. Rail steel bars range from 1.80c. to 1.95c. per lb., Franklin, Pa., and Tonawanda, N. Y., or 2.12c. to 2.27c. delivered Philadelphia, with no extra for cutting to length or bending.

Shapes.—Tonnage on mill books is small, but some substantial structural steel projects are being inquired for, including 1000 tons in a new warehouse for Morris Wheeler & Co., Philadelphia, 2300 tons in the Eighth Street subway and 2400 tons in a new contract on the Pennsylvania terminal improvement. Prices continue at 1.90c. to 1.95c., f.o.b. nearest mill to consumer, or 1.96c. to 2.01c., delivered Philadelphia. Occasionally 1.85c., f.o.b. mill, or 1.91c. a lb., delivered Philadelphia, is quoted to preferred buyers.

Plates.—Mills have closed a few contracts for first quarter with consumers who regularly buy ahead, but most users are still delaying commitments until after the beginning of the new year. Both contracts and sales for prompt shipment are being made at 2c. a lb., Coatesville, Pa., or 2.10c., delivered Philadelphia. Shipbuilders and other large preferred buyers of plates obtain the usual concessions made to purchasers of large tonnages.

Sheets.—Most mills are endeavoring to maintain 2.75c. a lb., base, for first quarter black sheet contracts, but

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅞-in. incl.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.90c.
†Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

on current buying for delivery over the next 30 days, 2.65c., Pittsburgh, or 2.97c., Philadelphia, has been quoted and occasionally 2.60c., Pittsburgh, or 2.92c., Philadelphia. Galvanized sheets are being maintained at 3.40c., Pittsburgh, or 3.72c., Philadelphia, both for contracts and early delivery. Blue annealed sheets are quoted at 2.35c. a lb., Pittsburgh, or 2.67c., delivered Philadelphia, for No. 13 gage, and blue annealed plates, No. 10 gage, at 2.20c., Pittsburgh, or 2.52c., Philadelphia. The usual concessions of \$2 to \$4 a ton are granted to automobile manufacturers and other preferred buyers.

Imports.—In the week ended Dec. 21, arrivals at this port consisted of 2500 tons of iron ore from Persia, 1199 tons of pig iron from British India and 12 tons of chrome bearing steel from Sweden.

Old Material.—Consumer buying has reached the lowest point of the year, the only feature of the past week having been the purchase of about 10,000 tons of No. 1 heavy melting steel by a Coatesville, Pa., consumer at \$14.50 a ton, delivered. Although mills are offering to buy heavy melting steel at \$14 a ton, delivered, brokers are unwilling to enter into contracts, as they are encountering some difficulty in buying good material at \$14 a ton, especially with a stronger scrap market in the Pittsburgh district.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.....	\$14.50
Scrap T rails.....	14.00
No. 2 heavy melting steel.....	\$12.00 to 12.50
No. 1 railroad wrought.....	15.50 to 16.00
Bundled sheets (for steel works).....	11.50
Hydraulic compressed, new.....	13.50
Hydraulic compressed, old.....	12.00 to 12.50
Machine shop turnings (for steel works).....	11.00
Heavy axle turnings (or equiv.).....	12.50 to 13.50
Cast borings (for steel works and roll. mill)....	11.00
Heavy breakable cast (for steel works).....	13.50 to 14.00
Railroad grate bars.....	11.00 to 11.50
Stove plate (for steel works).....	11.00 to 11.50
No. 1 low phos., hvy., 0.04% and under.....	21.00 to 22.00
Couplers and knuckles.....	19.00 to 19.50
Rolled steel wheels.....	19.00 to 19.50
No. 1 blast fnace scrap.....	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific).....	14.00
Shafting.....	19.00
Steel axles.....	20.00 to 21.00
No. 1 forge fire.....	13.00 to 13.50
Cast iron carwheels.....	15.50 to 15.75
No. 1 cast.....	15.00 to 15.50
Cast borings (for chem. plant).....	14.00 to 14.50
Steel rails for rolling.....	15.50 to 16.00

Eaton, Rhodes & Co. to Sell Pig Iron for Republic

The appointment of Eaton, Rhodes & Co., Cincinnati, by the Republic Iron & Steel Co. as sales agents for Pioneer pig iron has been announced. The arrangement covers Ohio and parts of Indiana, Kentucky and West Virginia. Pioneer pig iron is produced at the Birmingham plant of the Republic Iron & Steel Co., which has recently been equipped to cater extensively to the demand of foundries in the territory above mentioned.

Canadian Pig Iron and Steel Output Declines

Production of pig iron in Canada for November, at 86,516 gross tons, was 5 per cent under the total of 91,409 tons of October. The decline was in the basic and malleable grades. Basic iron dropped to 59,914 tons from 63,011 tons and malleable iron, at 7160 tons, fell from 9084 tons in the previous month, while foundry iron, at 19,442 tons, made a slight gain over the 19,314 tons produced in October.

For the 11 months, the Canadian production of pig iron totaled 1,007,612 gross tons, a gain of 8 per cent over the 934,085 tons reported for the corresponding 11 months of 1928.

Output of ferroalloys in November amounted to 7418 tons, as compared with 7674 tons in October. For the year to Dec. 1, production totaled 73,024 tons, as against 40,073 tons for the corresponding period of 1928.

Production of steel ingots and direct steel castings in November, at 93,648 tons, reached the low point for the year.

This output was 19 per cent under the 115,674 tons produced in October and 14 per cent less than the 108,463 tons reported for November, last year. The decline was mostly in steel ingots, which dropped to 89,135 tons from 110,165 tons in the previous month, but steel castings also fell to 4513 tons, as compared with 5509 tons in October.

For the 11 months, the output of steel ingots and direct steel castings aggregated 1,297,273 tons, an advance of 14 per cent over the total of 1,137,160 tons made during the corresponding 11 months of 1928. This year's output to date included 1,233,154 tons of ingots and 64,119 tons of direct steel castings.

Sheet and Tube Company May Buy Acme Steel

James A. Campbell, chairman of the board, Youngstown Sheet & Tube Co. and James E. MacMurray, chairman, Acme Steel Co., Chicago, have confirmed reports that negotiations are in progress for the purchase of the Acme company by the Sheet & Tube company. No agreement has been reached. An appraisal of the Acme properties is being made for the Youngstown Sheet & Tube Co.

British 1929 Steel Output a Post-War Record

WASHINGTON, Dec. 24.—Estimates of the output of raw steel in Great Britain in 1929, based on production for the first 11 months, indicate that if the average rate of output is maintained during December a post-war record will be established, according to a report from London to the Department of Commerce. Pig iron output is almost as satisfactory and it is apparent that the 1929 total will be exceeded by only one post-war

year. Estimates place steel production at 9,650,000 tons and pig iron at 7,500,000 tons.

The gain in output is ascribed to increased demand from the shipbuilding industry and to high prices and extended deliveries on Continental steel. It is stated, however, that British financial returns will not be commensurate with the increased production, as higher prices were more than offset by increases in costs of raw materials, particularly coke and iron ore.

Engineers Elect Technical Committee Chairman

Chairmen of the four standing technical committees of the American Society Mechanical Engineers for 1930, elected at the society's recent annual meeting in New York, are as follows: Fred R. Low, editor of *Power*, chairman of the power test codes committee (reelected); Robert L. Streeter, vice-president of the United States Aluminum Co., Pittsburgh, to head the research activities of the society; and Harold W. Mowery, safety engineer, American Abrasive Metals Co., New York, chairman of the standing committee on safety. Edward J. Kearney, secretary and treasurer of the Kearney & Trecker Corporation, Milwaukee, and a former president of the National Machine Tool Builders Association, was elected chairman of the standardization committee.

Skyscraper Is an Economic Necessity, Says Fabricator

Skyscrapers were declared to be economic necessities in modern city life by George E. J. Pistor, Hay Foundry & Iron Works, New York, a director of the American Institute of Steel Construction, in an address before a group of steel constructors of the New York district on Dec. 21. He stated that the skyscraper should be appraised for its contribution to the advancement of American civilization as well as for its contribution to architectural art.

American Rolling Mill Co. to Shut Down Elyria Mill

The American Rolling Mill Co. will shut down indefinitely its plant at Elyria, Ohio, and will produce cold-rolled strip steel hereafter at the plant at Butler, Pa. The Butler unit has been the source of supply of hot-rolled strip for the Elyria operation. It was considered more economical to transfer this finishing operation to Butler. The nucleus of an organization will be maintained at Elyria, and some cold-rolled products which cannot be made at Butler may be produced there. The Elyria unit was acquired by the American Rolling Mill Co. in its purchase of the Columbia Steel Co., which owned both the Butler and Elyria mills.

Birmingham

Furnaces Book Some First Quarter Pig Iron Orders at 50c Advance—New Steel Business Declines

BIRMINGHAM, Dec. 23.—Furnaces have booked a few pig iron tonnages for first quarter delivery at \$15, base, an increase of 50c. a ton. The usual lull in buying that comes at this season prevents any estimate as to how well the new price will be taken by the trade, but the impression is general that the new year will usher in improved business and, as consumers' stocks in many instances are low, actual requirements are expected to force a demand. On the other hand, there is the unfavorable factor of a large carry-over by several of the important melters. Shipments were very light during the past week. Sixteen furnaces remain active. Of this number, nine are on foundry iron, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil. \$14.50 to \$15.00
No. 1 fdy., 2.25 to 2.75 sil. 15.00 to 15.50
Basic 14.50 to 15.00

Finished Steel.—New business in all lines declined last week, as was expected under the influence of the inventory and holiday periods. However, in the several lines that had been moving exceptionally well in previous weeks, the decline is less than usual at this time of year. Specifications are likewise lighter. Major operations in the district are to be closed down for from three to five days this week. All prices are the same. Pending projects for structural steel give the market a good tone. Plants will begin the year with considerable business on the books. The Ingalls Iron Works Co. received an order for 400 tons for the Texas Gulf Sulphur Co., to be erected near Bowling, Texas, and the Virginia Bridge & Iron Co. will furnish 120 tons for an addition to the Lamson & Sessions Bolt Co. plant here. Reinforcing bar business continues light.

Cast Iron Pipe.—The only encouraging feature of the market is the increase in inquiries from utilities and municipalities, indicating that there will be a favorable season from these fields. Bids were opened last week on a few projects above 100 tons each, but no contracts were placed. Plants are closed down this week but, with a few exceptions, operations will be resumed first of next week. Shops have been taking advantage of recent light operations to make needed repairs in preparation for better activity expected next month. Quotations are firmer at \$37 to \$38 a net ton, Birmingham, for 6-in. and larger sizes.

Coke.—Foundry and industrial coke producers and dealers received numerous instructions last week to suspend shipments during the holiday season. Only eight ovens are idle of

a total of 1380. The price remains at \$5 a net ton, Birmingham.

Old Material.—Foundries have been closed down for the holiday period and only two or three of the larger mills continue to take scrap on contracts. The smaller foundries have light stocks and dealers are expect-

ing a good demand for most grades of scrap when operations are resumed with the turn of the year. Quotations are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel \$13.00 to \$13.50
Scrap steel rails 14.00
Short shoveling turnings... 9.00
Cast iron borings..... 9.00
Stove plate 11.50 to 12.00
Steel axles 22.00
Iron axles 23.00
No. 1 railroad wrought... 10.00 to 10.50
Rails for rolling..... 15.50
No. 1 cast..... 13.00
Tramcar wheels 12.50
Cast iron carwheels 13.00 to 13.50
Cast iron borings, chem... 13.50 to 14.00

Boston

Large Volume of Structural Steel Work in Prospect—Pig Iron Weak, Scrap Firmer

BOSTON, Dec. 23.—The most important iron sale made the past week was 800 tons of malleable to a Worcester, Mass., foundry at the equivalent of \$16.75 a ton, Buffalo. Business otherwise was confined to small lots, mostly No. 2X, at the equivalent of \$17 and \$17.50 a ton, Buffalo. Total bookings fell short of 4000 tons. A Vermont foundry, feeling out the market on 1000 tons of No. 2X, is reported to have obtained an offer of less than \$17 a ton, Buffalo, and low prices are said to have been made on 2150 tons wanted by another foundry. Another inquiry for 500 tons is in the market. A consignment of Dutch iron arrived there the past week, the first in a long time.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25...\$21.91 to \$22.41
*Buffalo, sil. 2.25 to 2.75... 21.91 to 22.41
*East Penn., sil. 1.75 to 2.25 22.65 to 23.15
East Penn., sil. 2.25 to 2.75 23.15 to 23.65
Va., sil. 1.75 to 2.25..... 25.21
Va., sil. 2.25 to 2.75..... 25.71
*Ala., sil. 1.75 to 2.25..... 24.11
*Ala., sil. 2.25 to 2.75..... 24.61
†Ala., sil. 1.75 to 2.25..... 20.25
†Ala., sil. 2.25 to 2.75..... 20.75

Freight rates: \$4.91 all rail from Buffalo; \$3.65 all rail from eastern Pennsylvania; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe.—A Massachusetts utility company has purchased 3000 tons of gas pipe. At least two other New England utilities are expected to close on 5000 tons within the next week. Salem, Mass., has placed 100 tons of 6 and 8-in. water pipe with the Warren Foundry & Pipe Co. Boston will, it is reported, be in the market shortly after Jan. 1 for several thousand tons of pipe, and numerous other New England municipalities will buy more heavily than usual during January and February. Foundries are offering fewer concessions on large sizes of pipe than heretofore, and the market on small appears firmer than it has been in some time. Foreign pipe apparently has faded out of the picture. Prices quoted on domestic pipe openly are: 4-in., \$44.10 to \$45.10 a ton, delivered common Boston freight

rate points; 6 to 12-in., \$40.10 to \$41.10; 16 to 20-in., \$39.60. A \$4 differential is asked on Class A and gas pipe.

Fabricated Steel.—Steel fabricators report that never before was so much tonnage in the making as now. Specifications on the bulk of this work will come out early next year. Considerable interest is shown by fabricators in the proposed Edison Electric Illuminating Co.'s Boston office building, due to the fact that all of its field connections are to be welded and that many wind braces are involved. The building will be 15 stories and require approximately 1300 tons of steel.

Old Material.—Little or no gain in the movement of scrap is noted, but indications are that business will be better shortly after Jan. 1. Pittsburgh mills are in the market for certain materials, supplies of which are limited in New England. Because of this demand prices in some cases are firmer. Consumers of chemical bor-

Warehouse Prices, f.o.b. Boston

Base per Lb.

Plates 3.365c.
Structural shapes—
Angles and beams 3.365c.
Tees 3.365c.
Zees 3.465c.
Soft steel bars, small shapes..... 3.265c.
Flats, hot-rolled 4.15c.
Reinforcing bars 3.265c. to 3.54c.
Iron bars—
Refined 3.265c.
Best refined 4.60c.
Norway rounds 6.60c.
Norway squares and flats 7.10c.
Spring steel—
Open-hearth 5.00c. to 10.00c.
Crucible 12.00c.
Tie steel 4.50c. to 4.75c.
Bands 4.015c. to 5.00c.
Hoop steel 5.50c. to 6.00c.
Cold-rolled steel—
Rounds and hex.....*3.55c. to 5.55c.
Squares and flats....*4.05c. to 7.05c.
Toe calk steel..... 6.00c.
Rivets, structural or boiler..... 4.50c.

Per Cent Off List

Machine bolts 50 and 5
Carriage bolts 50 and 5
Lag screws 50 and 5
Hot-pressed nuts 50 and 5
Cold-punched nuts 50 and 5
Stove bolts 70 and 10

*Including quantity differentials.

ings are again holding up shipments. In contrast with the generally better undertone of prices, the market for stove plate is decidedly easier. The limit the largest New England consumer will pay is \$9.50 a ton, delivered.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.	\$9.50 to \$10.00
Scrap T rails.....	9.50 to 10.00
Scrap girder rails.....	8.50 to 9.00
No. 1 railroad wrought....	10.50 to 10.75
No. 1 yard wrought.....	9.50 to 10.00
Machine shop turnings.....	6.00 to 6.10
Cast iron borings (steel works and rolling mill).....	6.00 to 6.10
Bundled skeleton, long....	8.25 to 8.50
Forge flashings.....	8.00 to 8.50
Blast furnace borings and turnings.....	5.75 to 6.10
Forge scrap.....	8.50 to 9.00
Shafting.....	13.50 to 14.00
Steel car axles.....	15.50 to 16.00
Wrought pipe 1 in. in diameter (over 2 ft. long).....	8.50 to 9.00
Rails for rolling.....	10.50 to 11.00
Cast iron borings, chemical.....	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast.....	\$14.00 to \$14.50
No. 1 machinery cast.....	15.00 to 15.25
No. 2 machinery cast.....	13.00 to 13.25
Stove plate.....	9.00 to 9.75
Railroad malleable.....	18.50 to 19.00

Canada

Forward Buying Starts in Pig Iron

TORONTO, ONT., Dec. 23.—First quarter pig iron buying is the feature of the market. Inquiries are growing in number. Substantial tonnages for forward delivery were booked during the week, and others are pending for closing before the end of the year. The chief demand is for foundry iron, although some booking has been done in malleable. The demand for basic iron is small. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$23.60
No. 2 fdy., sil. 1.75 to 2.25.....	23.10
Malleable.....	23.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$25.00
No. 2 fdy., sil. 1.75 to 2.25.....	24.50
Malleable.....	25.00
Basic.....	23.50

Imported Iron, Montreal Warehouse	
Summerlee.....	\$33.50
Carron.....	33.00

Old Material.—A slowing down in spot business has affected the Toronto and Montreal markets within the past few days. Consumers are taking in shipments against contracts and are placing small spot orders. Prices are unchanged.

Dealers' buying prices:

	Per Gross Ton	Toronto	Montreal
Heavy melting steel.	\$10.00	\$8.50	
Rails, scrap.....	11.00	9.00	
No. 1 wrought.....	10.00	12.00	
Machine shop turnings.....	7.50	5.00	
Boiler plate.....	7.50	6.00	
Heavy axle turnings.....	8.00	7.50	
Cast borings.....	7.50	5.00	
Steel borings.....	7.50	6.50	
Wrought pipe.....	6.00	6.00	
Steel axles.....	15.00	20.00	
Axles, wrought iron..	17.00	22.00	
No. 1 machinery cast.....	17.00	17.00	
Stove plate.....	13.00	13.00	
Standard carwheels..	16.00	16.00	
Malleable.....	13.00	13.00	

	Per Net Ton	Toronto	Montreal
No. 1 mach'ry cast..	\$16.00	....	....
Stove plate.....	12.00	....	....
Standard carwheels..	15.00	....	....
Malleable scrap.....	14.00	....	....

St. Louis

Pig Iron Market Strengthens Due to Birmingham Advance and Denial of Freight Rate Decrease

ST. LOUIS, Dec. 20.—The increase of 50c a ton in the price of Southern pig iron to \$15, Birmingham, has tended to give the market a firmer tone, while another strengthening factor has been the action of the Interstate Commerce Commission in denying the application of Southern interests for a reduction of 73c. a ton in freight rates to St. Louis and related or intermediate points in Illinois or Indiana. Sales for immediate shipment are confined to small lots. Some inquiries are being received for first quarter delivery. Sales of a leading Southern maker for December are said to equal the average for December.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill....	\$19.50 to \$20.00
Malleable, f.o.b. Granite City.....	20.00
N'th'n No. 2 fdy., deliv'd St. Louis.....	22.16
Southern No. 2 fdy., deliv'd Northern malleable, deliv'd.....	18.92 to 19.42
Northern basic, deliv'd....	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel.—Business in plates, shapes, and bars and sheets during the past week has been quiet, due to the approach of the holiday period. No business of importance is expected until after the turn of the year. Warehouse trade also is seasonally quiet, and smaller in volume than a year ago. Structural fabricators complain of dull trade. The low bidder for the general contract for the River Des Peres sewer project, requiring 2000 tons of reinforcing bars, is the Stiers Brothers Construction Co., St. Louis.

Old Material.—The market for old material continues quiet. A few sales were made for prompt shipment, but the lots were small and for mixtures. Consumers generally are waiting until after Jan. 1 before making additional purchases, but dealers expect a good buying movement then. Prices are un-

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	5.10c.
Blue ann'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	5.15c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.

Per Cent Off List

Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

changed. Railroad lists: Atchison, Topeka & Santa Fe, 5160 tons; St. Louis-San Francisco, 44 carloads; New York, Chicago & St. Louis, 45 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel.....	\$13.00 to \$13.50
No. 2 heavy melting or shoveling steel.....	12.00 to 12.50
No. 1 locomotive tires.....	14.50 to 15.00
Misc. stand-sec. rails including frogs, switches and guards, cut apart....	14.00 to 14.50
Railroad springs.....	15.50 to 16.00
Bundled sheets.....	9.50 to 10.00
No. 2 railroad wrought....	13.00 to 13.50
No. 1 busheling.....	9.75 to 10.25
Cast iron borings and shoveling turnings.....	9.25 to 9.75
Iron rails.....	13.00 to 13.50
Rails for rolling.....	15.06 to 15.50
Machine shop turnings....	6.75 to 7.25
Heavy turnings.....	9.50 to 10.00
Steel car axles.....	18.00 to 18.50
Iron car axles.....	25.50 to 26.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought....	13.00 to 13.50
Steel rails, less than 3 ft..	17.00 to 17.50
Steel angle bars.....	14.00 to 14.50
Cast iron carwheels.....	14.00 to 14.50
No. 1 machinery cast.....	15.25 to 15.75
Railroad malleable.....	13.50 to 14.00
No. 1 railroad cast.....	14.50 to 15.00
Stove plate.....	11.75 to 12.25
Agricult. malleable.....	14.00 to 14.50
Relay, rails 60 lb. and under.....	20.50 to 23.50
Relay, rails 70 lb. and over.....	26.50 to 29.00

Buffalo

Pig Iron Sales Chiefly in Small Lots for Prompt Delivery—Demand for Finished Steel Low

BUFFALO, Dec. 24.—About the only sizable pig iron inquiries that are still open are those of the Worthington Pump & Machinery Corporation for 600 tons of foundry, and the General Electric Co. for 4000 tons of foundry and malleable. Most of the producers report quite a volume of 50 and 100-ton lots. Shipments against old orders are very good. Almost everything being sold at present is for prompt delivery. There is an inquiry for 300 or 400 tons of foundry and malleable from a district consumer. The price here in the district

is steady at \$19.50, with no immediate prospect of any change. Foundries appear to be satisfied with this price

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.95c.
Cold-fin. flats, sq. and hex.....	4.45c.
Rounds.....	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.60
Black wire, base per 100 lb.....	3.75

and, while they do not believe the price is going down, neither do they believe that it will go up, so they are buying only for immediate needs. The going price for New England business seems to be \$17.50, though it is possible that \$17 could be done on a sizable tonnage.

Prices per gross ton, f.o.b. furnace:
 No. 2 fdy., sil. 1.75 to 2.25.....\$19.50
 No. 2X fdy., sil. 2.25 to 2.75..... 20.00
 No. 1 fdy., sil. 2.75 to 3.25..... 21.00
 Malleable, sil. up to 2.25..... 20.00
 Basic.....\$17.00 to 18.00
 Lake Superior charcoal..... 27.28

Finished Steel.—Demand for most of the finished lines is low. The Lackawanna plant of the Bethlehem Steel Co. has increased operations to 18 of 24 open-hearths, with most mills on single turn and some on double turn. A local fabricator has taken 150 tons of structural steel for an addition to the plant of the Republic Carbon Co., Niagara Falls, N. Y. Half a dozen other small fabricated structural orders are reported, all less than 100 tons each. Demand for reinforcing bars has dropped off, with nothing of size in immediate prospect.

Old Material.—Consumers are watching their stock piles carefully during the inventory period, and there is no disposition on their part to add to their accumulations. No important sales have been made in this district during the past week. Dealers are buying against old orders for No. 1 heavy melting steel at \$13.75, and it is possible that a mill seeking a tonnage of No. 1 could obtain it at \$14, the last price paid here.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$14.00
No. 2 heavy melting scrap.....	12.50
Scrap rails.....	\$13.00 to 14.00
Hydraulic comp. sheets.....	12.50
Hand bundled sheets.....	10.50 to 11.00
Drop forge flashings.....	12.50 to 13.00
No. 1 busheling.....	12.50
Hvy. steel axle turnings.....	12.50 to 13.00
Machine shop turnings.....	8.00 to 8.50
No. 1 railroad wrought.....	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers.....	17.00 to 17.50
Coil and leaf springs.....	17.00 to 17.50
Rolled steel wheels.....	17.00 to 17.50
Low phos. billet and bloom ends.....	18.00 to 18.50
Electric Furnace Grades:	
Short shov. steel turnings.....	10.75 to 11.25
Blast Furnace Grades:	
Short mixed borings and turnings.....	10.75 to 11.25
Cast iron borings.....	10.75 to 11.25
No. 2 busheling.....	8.00
Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.00
Iron axles.....	20.00 to 21.00
Cupola Grades:	
No. 1 machinery cast.....	14.50 to 15.00
Stove plate.....	12.15
Locomotive grate bars.....	10.00 to 10.50
Steel rails, 3 ft. and under.....	17.75 to 18.00
Cast iron carwheels.....	11.50 to 12.00
Malleable Grades:	
Industrial.....	16.50 to 17.00
Railroad.....	16.50 to 17.00
Agricultural.....	16.50 to 17.00
Special Grades:	
Chemical borings.....	12.00 to 12.50

The New York Aviation Show will be held Feb. 7 to 15, in Grand Central Palace, New York, under the auspices of the Aviators' Post No. 743, American Legion.

Cincinnati

Pig Iron Sales Total 3500 Tons But Demand Is Below Normal—Sheet Sales Gain Slightly

CINCINNATI, Dec. 23.—District consumers of pig iron entered the market for a total of about 3500 tons of iron last week. While this is slightly more than in the preceding week, the general demand for first quarter is still sluggish. Among the sales last week were several totaling 800 tons to Michigan consumers of low phosphorus iron for special work. A Cincinnati buyer took 200 tons of Southern foundry iron at a price which figures about \$14.50, base Birmingham. A Northern furnace received an order from a Connorsville, Ind., consumer for 400 tons of foundry iron and one for 150 tons of the same grade from a Dayton, Ohio, melter. These sales were for first quarter delivery. The remainder of the week's business was in small quantities for early consumption. Although Southern furnaces announced last week an increase in the base price of Southern iron at Birmingham to \$15, this new quotation does not affect the market north of the Ohio River. District furnace representatives indicate that the price in this area will continue at about \$14.50, base Birmingham, with possible concessions of about 50c. on substantial tonnages. The only inquiry before the trade is from a central Ohio melter for 400 tons of Northern foundry iron for first quarter.

Prices per gross ton, deliv'd Cincinnati:
 So. Ohio fdy., sil. 1.75 to 2.25.....\$19.89 to \$20.39
 Ala. fdy., sil. 1.75 to 2.25.. 17.69 to 18.19
 Ala. fdy., sil. 2.25 to 2.75.. 18.19 to 18.69
 Tenn. fdy., sil. 1.75 to 2.25. 17.69 to 18.19
 S'th'n Ohio silvery, 8 per cent..... 26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—With a slight increase in new bookings and a concurrent advance in production schedules, district sheet mills indicated that the low point in the demand had passed. In fact, a strengthening of buying confidence was reflected in the placing of several orders for advance rolling of approximately 30 days.

Output is about 60 per cent of ca-

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops.....	4.05c.
Bands.....	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares.....	4.35c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets.....	3.85c.
Small rivets.....	.65 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.85
Cement c't'd nails, base 100 lb. keg..	2.85
Chain, per 100 lb.....	8.75
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in..	\$16.50
4-in.....	34.50
Seamless steel boiler tubes, 2-in....	17.50
4-in.....	36.00

capacity, a slight increase over the preceding week. Several automotive companies have specified their first quarter needs. Some are taking sheets only for production of new models.

Coke.—Prices on by-product foundry coke continue at about \$10.05, delivered Cincinnati.

Old Material.—Although the continued steadiness of prices on old material is giving the market a slight undertone of firmness, dealers report that the movement of scrap both on contracts and on new orders is very slow.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$12.00 to \$12.50
Scrap rails for melting.....	13.00 to 13.50
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets.....	10.75 to 11.25
Cast iron borings.....	8.25 to 8.75
Machine shop turnings.....	8.00 to 8.50
No. 1 busheling.....	10.00 to 10.50
No. 2 busheling.....	6.50 to 7.00
Rails for rolling.....	13.50 to 14.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	12.00 to 12.50
Short rails.....	17.50 to 18.00
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	18.50 to 19.00
No. 1 railroad cast.....	15.00 to 15.50
Burnt cast.....	10.00 to 10.50
Stove plate.....	10.00 to 10.50
Brake shoes.....	10.00 to 10.50
Agricultural malleable.....	14.00 to 14.50
Railroad malleable.....	15.00 to 15.50

Pacific Coast

San Diego Pipe Line Calls For 5000 Tons of Plates—Good Structural Business in Sight

SAN FRANCISCO, Dec. 21. (*By Air Mail*).—Interest centers in the opening of bids next week on 5000 tons of plates for a pipe line at San Diego. Among the week's larger lettings were 450 tons of reinforcing bars for a grain elevator in Tacoma, booked by the Pacific Coast Steel Co., and 320 tons of structural shapes for a high school in South Gate, Cal., placed with Brombacher Iron Works.

Pig Iron.—Foundry activity has shown little sign of improvement and,

as a result, sales and inquiries are limited to small lots for prompt shipment. Quotations are unchanged.

Prices per gross ton at San Francisco:

*Utah basic.....	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25.....	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25.....	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—While awards of reinforcing steel bars this week were fairly numerous, the bulk of the lettings involved lots of less than 100 tons. In addition

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.30c.
Soft steel bars.....	3.30c.
Small angles, $\frac{3}{8}$ -in. and over.....	3.15c.
Small angles, under $\frac{3}{8}$ -in.....	3.55c.
Small channels and tees, $\frac{3}{8}$ -in. to	
2 $\frac{3}{4}$ -in.....	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker.....	5.00c.
Black sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.90c.
Galv. sheets (No. 24).....	5.30c.
Struc. rivets, $\frac{1}{2}$ -in. and larger.....	5.65c.
Com. wire nails, base per keg.....	\$3.40
Cement c'd nails, 100 lb. keg.....	3.40

to the grain elevator mentioned above, 325 tons for a power house for the Lake Cushman project, Tacoma, was placed with the Pacific Coast Steel Co. and the United States Steel Products Co. The Los Angeles Iron & Steel Co. was low bidder on 104 tons for Los Angeles. Bids have been opened on 306 tons for paving work in Los Angeles County and on 267 tons for a bridge at Santa Ana, Cal. Los Angeles out-of-stock prices are unchanged at 2.40c., base, on carload quantities and at 2.70c. on smaller lots. San Francisco prices are \$2 a ton lower. Merchant bar steel is not active, but prices remain firm at 2.35c., c.i.f., coast ports.

Plates.—Among plate lettings this week were 225 tons for a 500,000 gal. steel tank and tower for Los Angeles, placed with the Pittsburgh-Des Moines Steel Co., and 800 tons additional for a penstock in Vancouver for the British Columbia Electric Railway Co., booked by the Vancouver Engineering Works. Bids will be opened Dec. 23 on 5000 tons for a pipe line at San Diego. Plate prices are weak, and 2.25c., c.i.f., appears general now, with desirable lots bringing quotations of \$1 to \$2 a ton under this figure.

Shapes.—Only one structural award in excess of 100 tons was placed during the week. This was 320 tons for a school at South Gate. Pending business, however, calls for more than 9000 tons. Prices on plain material continue firm at 2.35c., c.i.f.

Cast Iron Pipe.—While no large lettings of cast iron pipe were reported this week, two projects involving good-sized lots came into the market for figures. Los Angeles will open bids on Dec. 23 for 2650 tons of 16 and 24-in. Class C pipe, and Vancouver, B. C., will open bids on Jan. 6 for 358 tons of 6-in. Class C pipe. Bids have been opened on 134 tons of 2 to 8-in. Class B pipe for the improvement of Flower Street, Santa Ana, Cal. Bids were also opened at West Salem, Ore., for 140 tons of 4 to 8-in. Class B pipe. Pipe mill representatives look for a decided increase in demand in the early part of January.

New York Edison Co. and associated electric light and power companies serving the five boroughs of New York have approved a budget of \$76,848,053 for construction purposes in 1930, according to an announcement by Matthew S. Sloan, president of these companies.

Business Survey Committee Appointed Steps Being Taken by Chamber of Commerce of United States to Observe Developments in Trade and Industry

WASHINGTON, Dec. 24.—Reports indicate that various industries are already taking steps to fortify their position and to carry into effect the general purpose of maintaining economic stability, formulated at the conferences called by President Hoover and the subsequent National Business Survey Conference held on Dec. 5 under the auspices of the Chamber of Commerce of the United States. Announcement to this effect was made by Chairman Julius Barnes of the National Chamber in connection with making public a list of upward of 100 business executives to serve as the Business Survey Conference Committee. It will be the duty of this committee "to bring to a common focus information concerning conditions in typical lines of industry and trade and keep under continuous observation developments in the national business field."

Members of the committee will be asked to interpret and report from time to time on the condition and outlook in their several lines of industry. These reports are expected to disclose the major trends in business and to reveal whether there are weaknesses in the national economic structure. They will be submitted to the executive committee of the conference, previously announced, and made the basis for determining whether corrective measures are practicable and necessary. If such measures are decided upon, they will be brought to the attention of the individual members of trade associations through the conference committee.

In connection with steps being taken to accomplish the purpose of the business survey, it was stated that chambers of commerce are looking especially to the furtherance of public building programs and the stimulation of repair, replacement and betterment work during the winter months. Mr. Barnes has communicated with commercial organizations and trade associations concerning repairs and general betterment during the next few months.

He pointed out that the conference had suggested that advantage be taken in the next two or three months for repairs, maintenance, clean-up, general betterments, improvement, re-equipment and replacements prior to the spring period when the large public and private construction programs reported to the conference will be getting into full swing with consequent enlarged demand for labor and materials. It was stated that the Department of Commerce has set up a division of public construction, which is actively working to assist Federal, State and local authorities in development and coordination of their programs, while the trade associations and chambers of commerce are also

cooperating in connection with both public and private major construction programs. It was suggested that "it will be distinctly helpful if you could set up some way to estimate the volume of the expenditures for repairs and betterments that will result for 1930 as compared with 1929 and particularly for the first three months of 1930 compared, if possible, with the corresponding period of the past year."

Mr. Barnes said it is quite likely that for the purpose of checking progress and comparison to guide action which may later be helpful, the chamber would in the near future suggest some method for these organizations to report progress at given intervals, perhaps monthly, for a short time.

Request has also been made by Mr. Barnes that the advisory committee report briefly on the existing situation and outlook in their respective fields as the year closes, so that information concerning business activities and the immediate outlook may be available for consideration in determining further steps to be taken to carry out the purposes of the conference. It was suggested that the reports be put into the mails by Dec. 28.

Among those named on the Business Survey Conference Committee are: James B. Bonner, Philadelphia, American Iron and Steel Institute; Gen. Otto H. Falk, Milwaukee, president, Allis-Chalmers Mfg. Co., representing machinery manufacturers; W. W. Coleman, Milwaukee, National Metal Trades Association; A. E. McKinstry, Chicago, National Association of Farm Equipment Manufacturers; Charles Piez, Chicago, Shovel and Crane Manufacturers' Association, and W. W. Wood, Decatur, Ill., American Institute of Steel Construction, Inc.

Westinghouse to Build \$1,500,000 Laboratory

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has announced the construction of a central engineering laboratory and an addition to the present direct current power laboratory at East Pittsburgh, to cost approximately \$1,500,000. The new laboratory will eventually replace numerous smaller laboratories and experimental test stations now scattered throughout the plant, and will be in keeping with the company's tendency toward consolidation of its facilities at central points. Six upper floors of the new building will house engineering offices, and the remaining area will be devoted to miscellaneous experimental work. The new laboratory will be 11 stories, 80 ft. x 225 ft.

Exports Lower in November

Year's Total Will Be Largest Since 1920—Imports Well Below Last Year

WASHINGTON, Dec. 21.—Exports of iron and steel products from the United States for 1929 will be the largest since 1920, when they aggregated 4,927,800 gross tons. This became evident with the returns for November of 1929 showing exports to be 241,829 tons, bringing the total for the 11 months to 2,817,110 tons or only 45,887 tons under the total for 12 months in 1928, amounting to 2,862,997 tons, which was the largest annual movement since 1920. For the first 11 months of 1928 they aggregated 2,642,912 tons, which now is exceeded by 6½ per cent.

Assuming that December, 1929, exports are only 240,000 tons, or less than the monthly average of 256,101 tons for the 11 months, the aggregate for 1929 would be 3,057,000 tons. The record export movement was in the war year 1917, with a total of 6,414,120 tons.

Imports in November, 1929, were 54,041 tons and for the 11 months of 1929 they amounted to 691,433 tons as against 727,310 tons for the corre-

sponding period of 1928. For the 12 months of 1928 they were 782,694 tons.

Exports in November declined 54,041 tons from those for October. The principal exports in November, 1929, were scrap, 55,565 tons; plain structural shapes, 25,465 tons; skelp, 17,499 tons; tin plate, 16,781 tons; and plates, 16,698 tons. Canada was the principal market for the month, taking 102,524 tons in all. Other outstanding markets were Japan, 42,550 tons; Chile, 14,296 tons; Mexico, 7090 tons; the Philippine Islands, 7023 tons; and Italy, 6182 tons.

Imports in November were the next to lowest for any month of the year. Pig iron was the principal item of importation, incoming shipments being 12,702 tons. Next came structural shapes, 11,961 tons; scrap, 6843 tons; ferromanganese, 4654 tons; and wrought pipe, 3767 tons. Belgium supplied 10,410 tons of the total; Germany, 9218 tons; Canada, 9010 tons; India, 7053 tons; and the United Kingdom, 6473 tons.

Future of Coal a Chemical Problem

New Outlets to Compensate for Losses to Other Fuels and New Technique to Win Inherent Possibilities of Coal

"MODERN science dealing with fuel may draw to the coal fields new industries not thought of a generation ago," said Dr. Thomas S. Baker, Pittsburgh, president, Carnegie Institute of Technology, in addressing the recent convention of the American Mining Congress in Washington. Doctor Baker spoke on "The Laboratory as the Open Door to the Future of Coal."

He declared that the processing of coal will produce great quantities of gas which formerly was wasted, but which in the future may be piped to distant cities, so that some day the gas to be burned in New York may come from the coke ovens of Pennsylvania. Continuing Doctor Baker said, in part:

"Processing of coal will also produce great quantities of tar, which will be distilled probably near the mines, and the various stages of refining will create new enterprises out of what are now only laboratory experiments. Chemical industries are likely to draw more closely toward coal fields. Localities where coal is situated will grow in importance. The newer chemistry will bring about new industrial developments, many of which will take place in the regions where the basic material is found.

"Whatever may happen to other parts of our country, we can prophesy that those regions where soft coal is

found will enjoy an ever-increasing activity and probably an expanding prosperity. We cannot foresee in just what respects science would cure the ills of the coal industry. We may be certain that it would not banish them as if by magic, but we may be confident that some of the apparently insurmountable difficulties will yield to the patience and hard work of the investigator.

"We are entering upon a new era of fuel technology and the demand for men educated in the new science will be very insistent. Our wealth of coal assures our country a long continuance of its industrial greatness. Undoubtedly coal will serve as the chief source of energy until some revolutionary discovery makes obsolete the physical theories of today. Even though we may harness every stream and watercourse in the country, the electricity thus gained will hardly furnish more than a third of the power demanded by future generations.

"We see inroads into the coal industry by new engineering and scientific developments. Railroads are moving more of their trains by electric power, generated in many instances not from coal, and oil-electric locomotives are supplanting some coal-burning engines. The problem of the coal industry is to find new uses, new outlets, and new employ-

ment for its commodity, and we are beginning to see that science can help in finding them.

"Search is being made for a satisfactory low-temperature distillation process which will increase the value of coal and provide a cheaper substitute for anthracite for domestic purposes, by transmitting low-grade bituminous into high-grade fuel. A development in coal chemistry is the production of synthetic petroleum from coal. One of the far-reaching discoveries of the coal chemist in an economic sense is the production of synthetic fertilizers. In time it may be profitable for the mine owner to fabricate his product and thus add to the value and the wealth of the country."

Stanley Electric Tool Co. Buys Two More

The Stanley Works, New Britain, Conn., through its subsidiary, the Stanley Electric Tool Co., has purchased two additional companies, the Crowe Mfg. Corporation, Cincinnati, and the L. R. Carter Co., Syracuse, N. Y. Both are manufacturers of electrically operated tools. A few weeks ago the Stanley company announced the purchase of the Unishar Co., New York, and the Ajax Electric Hammer Corporation, New York. These new acquisitions make the Stanley company one of the largest in the country in the manufacture of electric tools.

All of the companies except the Carter company will move to New Britain at once. The Carter plant will be moved later. The Stanley company plans the expansion of its district sales offices throughout the country.

Republic May Move Head Offices to Cleveland

The new Republic Steel Corporation may move its general offices to Cleveland, following the completion of the merger of the Republic Iron & Steel Co., the Central Alloy Steel Corporation, the Donner Steel Co. and the Bourne-Fuller Co. Meanwhile, industrial and business leaders of Youngstown have joined in an effort to retain the headquarters in that city.

Directors of the consolidated company have not yet chosen the executive headquarters. For years the Republic Iron & Steel Co. has maintained executive and general sales offices in its own building in Youngstown. Leaders in the movement to retain the headquarters in Youngstown include John T. Harrington and Philip Wick, who are associated with Cyrus S. Eaton in his merger plans; A. E. Adams, president First National-Dollar Banks, and H. W. Grant, president, Youngstown Chamber of Commerce.

Formal notices to stockholders of the proposed merger probably will be mailed shortly. Until the stockholders ratify the proposed action, further developments probably will proceed slowly.

Non-Ferrous Metal Markets

Copper Quiet, With Prices Firm—Zinc and Lead Sales Are Good

NEW YORK, Dec. 23.

Copper.—There has been little change during the past week. The amount of business has been small and for immediate delivery. Consumers see no reason to buy ahead, since they doubt whether the present price of electrolytic copper will be maintained, long into the coming year. Furthermore, the nearness of the inventory period has been another factor in their decision to satisfy only current requirements. Large users still are pressing for an abandonment of the 18c. schedule, but seem less confident of success than a few weeks ago. Producers have previously demonstrated their ability to maintain the price under stress. A leading market observer predicts that if any break occurs, it will not come until the second quarter of 1930 and only then because producers think it expedient for the best interests of the industry as a whole rather than because of being compelled to yield to the pressure exerted by their customers. The few orders that have been placed have been well distributed among foreign and domestic consumers. Electrolytic copper for export is unchanged at 18.30c., c.i.f. usual European ports. Lake copper is firm at 18c. to 18.12½c., delivered.

Tin.—The trade is in the midst of a holiday market, with little interest being shown by consumers. The small sales reported in the past week have been mostly to dealers. The dullness has affected the price of spot Straits tin, which today was quoted at 39.50c., New York. Scarcely any news has come from London in regard to the group activities there and the developments in proposed mergers. The London market has declined slightly in the past week, and today spot standard was selling at £178 2s. 6d. and future standard and spot Straits at £181 2s. 6d. The price at Singapore was £184 12s. 6d.

Zinc.—At the beginning of the week, prime Western zinc dropped further to 5.45c., East St. Louis. The decline brought out heavy orders from users, who felt that the bottom had been reached. In fact, the volume of sales in the last fortnight, at 5.50c. and 5.45c., has been the best in several months. However, producers are reluctant to let consumers have all of the material they want at the pres-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Dec. 23	Dec. 21	Dec. 20	Dec. 19	Dec. 18
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.....	39.50	39.62½	39.62½	40.50	40.50
Zinc, East St. Louis.....	5.45	5.45	5.45	5.45	5.45
Zinc, New York.....	5.80	5.80	5.80	5.80	5.80
Lead, St. Louis.....	6.10	6.10	6.10	6.10	6.10
Lead, New York.....	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	23.25c.
Copper, hot rolled	26.75c.
Zinc	10.50c.
Lead (full sheets)	10.00c.
Seamless Tubes—	
High brass	28.25c.
Copper	29.25c.
Rods—	
High brass	21.25c.
Naval brass	24.00c.
Wire—	
Copper	19.87½c.
High brass	23.75c.
Copper in Rolls	26.75c.
Brass Tubing	30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	10.30c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brass Tubing	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c. to 31.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.
Brass Tubing	29.12½c. to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	10.75c. to 11.25c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	43.50c. to 44.50c.
Tin, bar	45.50c. to 46.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	7.00c. to 7.50c.
Lead, American pig	7.00c. to 7.50c.
Lead, bar	9.00c. to 9.50c.
Antimony, Asiatic	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	28.50c. to 29.50c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	46.25c.
Tin, bar	48.25c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	8.00c. to 8.25c.
Lead, American pig	7.00c. to 7.20c.
Lead, bar	9.25c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.00c.
Babbitt metal, high grade	49.00c.
Solder, ½ and ½	30.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.00c.
Copper, hvy. and wire	14.50c.	15.50c.
Copper, light and bottoms	12.50c.	13.50c.
Brass, heavy	8.00c.	9.00c.
Brass, light	6.75c.	7.75c.
Hvy. machine composition	11.00c.	12.00c.
No. 1 yel. brass turnings	9.00c.	9.50c.
No. 1 red brass or compos. turnings	10.50c.	11.75c.
Lead, heavy	4.75c.	5.25c.
Lead, tea	3.75c.	4.25c.
Zinc	3.25c.	3.75c.
Sheet aluminum	11.00c.	12.00c.
Cast aluminum	10.00c.	12.00c.

ent level and therefore are not actively soliciting business. They are content to let their customers cover their requirements for the first quarter, but prefer not to make bookings indiscriminately at 5.45c.

Lead.—Substantial orders for January shipment have been received by producers. Some inquiries for February have appeared, but sellers are not willing to book business that far ahead. The good volume of sales is due to the belief of users that prices have been stabilized at 6.10c., St. Louis, and 6.25c., New York.

Antimony.—The market for Chinese metal remains dull, with prices for spot and future delivery at 8.37½c., New York, duty paid.

Nickel.—Ingot nickel in wholesale lots is quoted at 35c. a lb., shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Dec. 23.—Prices for copper and lead remain steady. Quotations on zinc, tin and antimony are lower. Sales in the past week have been in small volume. The old metal market is without feature.

Prices per lb., in carload lots:
Lake copper, 18.50c.; tin, 40.75c.; lead, 6.20c.; zinc, 5.60c.; in less-than-carload lots, antimony, 9.25c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

St. Louis Improvements to Cost \$12,000,000

Expenditure of \$12,000,000 on public improvements during 1930 is planned by the city of St. Louis, according to William E. Rolfe, associate to the president of the Board of Public Service.

New buildings will involve \$1,500,000, while \$500,000 will go for the erection of bridges and viaducts. Foremost among the new buildings projects will be a \$600,000 nurses' home and a bird house in the Zoo costing \$202,000.

The remaining \$10,000,000 will be spent for street paving, street reconstruction, sewer and drainage work. W. W. Horner, chief engineer of paving and sewers for the city, has estimated that in 1930 sewer and drainage work will aggregate about \$4,050,000, while \$5,650,000 will be spent for paving. Drainage, paving and surface work on the municipal airport will call for another \$300,000.

A report entitled "Sharing Profits with Employees" has just been published by the Policyholders Service Bureau of the Metropolitan Life Insurance Co., New York. The survey is based on the experience of more than 80 companies.

Fabricated Structural Steel

Awards, at 90,000 Tons, Include 50,000 Tons for Empire State Building, New York

WITH awards at 90,000 tons, the past week was the second best of the year. This is regarded as a remarkable showing for late December, when the Christmas holidays generally cause a slump in activities. Over 75 per cent of the lettings were in the New York metropolitan area. The outstanding contract was for the Empire State Building, New York, which will be erected on the old site of the Waldorf-Astoria Hotel. This project, awarded on Dec. 20, will require about 50,000 tons of steel, although the exact amount is not yet known.

New work which appeared for bids in the past week totaled about 24,000 tons, of which 4000 tons is for a New York hotel. Awards follow:

BUCKSPORT, ME., 3500 tons, paper manufacturing plant, to New England Structural Co.

NEW YORK, 6800 tons, subway section, to Bethlehem Steel Co.; general contractor, Arthur A. Johnson Corporation.

NEW YORK, 1100 tons, apartment building, to Taylor-Fichter Steel Construction Co.; James Stewart & Co., general contractors.

NEW YORK, 200 tons, residence on East Side, to Easton Structural Steel Co.

NEW YORK, 50,000 tons, Empire State Building, to American Bridge Co.

NEW YORK, 1200 tons, trade school on Sixty-seventh Street, to Levering & Garrigues Co.

NEW YORK, 1000 tons, buildings for Hunter College, to unnamed fabricator.

NEW YORK, 1500 tons, apartment building at Eighty-ninth and Park Avenue, to Hay Foundry & Iron Works.

NEW YORK, 2000 tons, apartment building at Seventy-ninth Street and Amsterdam Avenue, to Hay Foundry & Iron Works.

NEW YORK, 300 tons, building at Seventy-ninth Street and Amsterdam Avenue, to Harris Structural Steel Co.

NEW YORK, 700 tons, 12-story apartment building on West Ninety-second Street, to Dreier Iron Works.

NEW YORK, 1100 tons, public school No. 238, to Bethlehem Fabricators, Inc.

NEW YORK, 400 tons, public school No. 224, to Bethlehem Fabricators, Inc.

NEW YORK, 1000 tons, apartment building at 250 West Seventy-second Street, to Harris Structural Steel Co.

NEW YORK, 1250 tons, building for Hanover Bank & Trust Co. at Church and Franklin Streets, to Heddon Iron Works.

BROOKLYN, 600 tons, 15-story apartment on Hanson Place, to Berkshire Iron Works.

BROOKLYN, 1100 tons, public school No. 241, to Easton Structural Steel Co.

SCHENECTADY, N. Y., 500 tons, City Hall, to Belmont Iron Works.

PENNSYLVANIA RAILROAD, 200 tons, bridge, to American Bridge Co.

NEW YORK, 200 tons, memorial building at 124 East 112th Street, to Grand Iron Works.

CLEVELAND, 1365 tons, building for National Town and Country Club, to McClintic-Marshall Co.

NAPERVILLE, ILL., 375 tons, building for Naperville College, to an unnamed bidder.

NIAGARA FALLS, N. Y., 150 tons, addition for Republic Carbon Co., to McClintic-Marshall Co.

PENSACOLA, FLA., 400 tons, Armstrong Court building, to Worden-Allen Co., Milwaukee.

BOWLING, TEX., 400 tons, Texas Gulf Sulphur Co., to Ingalls Iron Works.

BIRMINGHAM, 120 tons, addition to Lamson & Sessions Bolt Co. plant, to Virginia Bridge & Iron Co.

CINCINNATI, 1750 tons, railroad bridge

for Cincinnati Union Terminals Co., to Mount Vernon Bridge Co.

GRANITE FALLS, MINN., 1900 tons, power plant, to Minneapolis-Moline Power Implement Co.

WAUKEGAN, ILL., 3500 tons, power house for Public Service Co. of Northern Illinois, to Mississippi Valley Structural Steel Co.

DULUTH, MISSABE & NORTHERN RAILROAD, 400 tons, bridge work, to American Bridge Co.

MILWAUKEE, 1500 tons, addition to Lakeside power plant of Milwaukee Electric Railway & Light Co., to Worden-Allen Co.

OKLAHOMA CITY, OKLA., 1000 tons, power house, to Stupp Brothers Bridge & Iron Co., St. Louis.

SOUTH GATE, CAL., 320 tons, high school, to Brombacher Iron Works.

LOS ANGELES, 225 tons plates, 500,000-gal. tank and tower, to Pittsburgh-Des Moines Steel Co.

VANCOUVER, B. C., 800 tons plates additional, penstock for British Columbia Electric Railway, to Vancouver Engineering Works.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

BOSTON, 1800 tons, Edison Electric Illuminating Co. office building.

NEW YORK, 4000 tons, hotel at 228 West Forty-seventh Street.

NEW YORK, 1200 tons, apartment building on Seventy-second Street.

PHILADELPHIA, 2000 tons, highway bridge.

PHILADELPHIA, 1000 tons, Henry Street bridge.

PHILADELPHIA, 2400 tons, Contract No. 7 on Pennsylvania terminal improvement.

PHILADELPHIA, 2300 tons, Eighth Street subway; bids open Dec. 30.

PHILADELPHIA, 1000 tons, new warehouse for Morris Wheeler & Co.

ATLANTIC COAST LINE RAILROAD, 100 tons, bridge.

PITTSBURGH, 1300 tons, addition to Duquesne Club.

ROGERS CITY, MICH., 600 tons, power house for Michigan Limestone & Chemical Co.

CHICAGO, 500 tons, building for Dallas Brass & Copper Co.

SAN ANTONIO, TEX., 3600 tons, administration building for Southwestern Bell Telephone Co.

ST. LOUIS, 250 tons, garage for Union Electric Light & Power Co.

SEATTLE, 1000 tons, Washington Athletic Club; general contract to Sound Construction Co.

MIDWAY, FLA., 180 tons, mill building for Fuller's Earth Co., Cleveland.

CANTON, OHIO, 200 tons, store for Halle Brothers Co.

TOLEDO, 100 tons, branch exchange building for Ohio Bell Telephone Co.

RACINE, WIS., 300 tons, vocational school.

PERSONAL

JOHN A. TOPPING, chairman of the board, Republic Iron & Steel Co., has announced his retirement from active business. He has completed more than a half century in the iron and steel industry. Mr. Topping said that he had for some time contemplated retiring, and that the formation of the new Republic Steel Corporation afforded him the opportunity to shift the responsibility of business management to others. Mr. Topping said further that he was heartily in accord with



JOHN A. TOPPING

the merger, which, when concluded, would be highly beneficial to all interests. Mr. Topping started in the iron business in 1878 with the Aetna Iron & Nail Co., and became its president in 1898. Later the company was merged with another to become the Aetna-Standard Iron & Steel Co., and this in turn went into another merger and became a part of the American Sheet Steel Co., of which Mr. Topping was first vice-president. He resigned in 1903 and undertook the reorganization of the La Belle Iron Works. In July, 1904, he was elected president of the American Sheet & Tin Plate Co., remaining in that position until January, 1906, when he was made president of the Republic Iron & Steel Co. and chairman of the Tennessee, Coal, Iron & Railroad Co. He was made chairman of the Republic company in 1908, and had continued in that position for nearly 22 years. Mr. Topping has taken a very active part in the affairs of the American Iron and Steel Institute, of which he is vice-president.

GEORGE G. SMALL, vice-president, United Engineering & Foundry Co., Pittsburgh, has tendered his resignation and will retire from active business Jan. 1. He has been associated with the company and its predecessor for 36 years. Mr. Small was born near East McKeesport, Pa., in 1864, and at-

tended the Indiana State Normal College, Indiana, Pa. Later he became identified with the Apollo Foundry Co. and the Apollo Iron & Steel Co., Apollo, Pa., the latter concern now the Vandergrift plant of the American Sheet & Tin Plate Co. In 1893 he became associated with the Lincoln Foundry Co., and when the United Engineering & Foundry Co. was organized in 1901, he was made manager of the Lincoln Foundry Co. department. He was elected second vice-president of the company in 1905, and first vice-president 10 years later. During his career with the company, Mr. Small has given special attention to the manufacture of chilled, sand and alloy iron rolls, and has become widely known for his technical and practical knowledge of this subject.

E. F. MARRESFORD, formerly with the American Machine & Foundry Co., has joined the sales staff of the Watson-Stillman Co., New York.

L. B. GREEN, formerly development engineer of the Borden Co., Warren, Ohio, has become works manager of the Globe Machine & Stamping Co., Cleveland.

W. B. PICKUP has been appointed special representative of the Positive Lock Washer Co., Newark, N. J.

F. H. DALRYMPLE has been placed in charge of the newly-opened Cleveland district office of the Union Chain & Mfg. Co., Sandusky, Ohio.

ARTHUR E. NORTON, Harvard Engineering School, Cambridge, Mass., discussed design and lubrication of bearings at the monthly meeting of the Plant Engineers' Club, Dec. 18, at the University Club, Boston.

RAY M. HUDSON resigns post as assistant director of the Bureau of Standards, in charge of commercial standardization, to become secretary of the Massachusetts Division of the New England Council, with headquarters in Boston. Ever since his graduation from Syracuse University in 1908, he has devoted himself largely to the study of simplification, standardization and scientific management methods, and today is recognized nationally as an authority on the elimination of industrial waste. Before being called by Mr. Hoover, then Secretary of Commerce, as technical assistant in the Division of Simplified Practice, he was associated for several years with Col. George D. Babcock, a member of the Hoover Committee on Waste in Industry, in the installation of scientific management methods in the plants of the H. H. Franklin Mfg. Co., Syracuse, and of the Holt Mfg. Co., at Peoria, Ill. During the war he served with the

Emergency Fleet Corporation, as a production engineer in the procurement of machinery. In 1923, Mr. Hudson was made Assistant Chief of the Division of Simplified Practice, and in 1925, its Chief. With the creation, in September, 1927, of the commercial standardization group within the Bureau of Standards, he became an assistant director of the Bureau, in charge of this work.

CHARLES E. MITCHELL has been appointed associate manager of the Gray Iron Institute, Cleveland, and will act as an assistant to Arthur J. Tuscany, the manager, in the executive work of the Institute. Mr. Mitchell is regarded as well qualified



CHARLES E. MITCHELL

for his duties dealing with accounting, merchandising and association promotional work as he has devoted his time to that work during the past 18 years. For 10 years he was accountant and office manager of the Ohio Bell Telephone Co., Cleveland. More recently he has been engaged in organization work, being the manager of a local Cleveland association from which he resigned to take up his duties with the institute.

C. K. EVERITT, heretofore managing director of Edgar Allen & Co., Ltd., Sheffield, England, has been elected chairman of the board of directors, succeeding ROBERT WOODWARD, who resigned.

JAMES H. EDWARDS, chief engineer, American Bridge Co., New York, has made the following appointments in the engineering department, effective Jan. 1:

R. R. GRAHAM, as assistant engineer, Eastern division, at 30 Church Street, New York; J. E. ELLIOTT, assistant engineer, Central division, Frick Building, Pittsburgh; F. W. DENCER, assistant engineer, Western division, 208 South La Salle Street, Chicago.

H. W. BOYD, formerly secretary, Tinius Olsen Testing Machinery Co.,

Philadelphia, who was elected vice-president, succeeding Thorsten Y. Olsen, the new president, has been connected with the company since 1888. He was successively shop foreman, superintendent for about 20 years and secretary for eight years.

HARRY G. UPHOUSE of the Donner Steel Co., Buffalo, who has been transferred by the company to the Buffalo office, where he will have charge of district sales of steel and pig iron, will be given a farewell dinner by friends in the Philadelphia district on Dec. 30, at the Penn Athletic Club.

FRANK W. FUNK has become managing engineer of the Jackson, Mich., division of Stevens & Wood, New York, engineers and constructors.

A. H. BOARDMAN, for the past seven years in the purchasing department of the Shell Oil Co., has been appointed manager of the San Francisco district, with offices at 39 Stevenson Street, San Francisco, for the Monarch Foundry Co., Stockton, Cal.

Obituary

J. C. WATERBURY, president, Waterbury Co., New York, manufacturer of wire rope, died from a fall from a train at Weehawken, N. J., Dec. 20, aged 49 years.

PRESCOTT I. JOHNSTON, for many years shop superintendent of the Consolidated Machine Tool Corporation of America, Rochester, N. Y., died in that city on Dec. 14.

SAMUEL BATES, president, Pioneer Thresher Co., Shortsville, N. Y., died suddenly as his home in Rochester on Dec. 18, aged 66 years.

E. H. PEARSON, New York district manager of the Electric Machinery Mfg. Co., Minneapolis, died on Dec. 7, aged 36 years.

ELLIOT J. BROWN, for the past 25 years chief engineer at the Washburn Wire Co., Philipsdale, R. I., died suddenly on Dec. 17. He was born at Mapleton, Pa., in 1871. Leaving Juniata College before he was graduated, he studied engineering and later was chief engineer at plants located at Altoona, Pa., and New Haven, Conn.

IRVING T. HARTZ, president, Morden Frog & Crossing Works, Chicago, died Dec. 17. He was, successively, secretary and manager of the Calumet Iron & Steel Co., president of the Union Cold Storage Co., vice-president of the Morden Works, and its president since 1907.

WILLIAM PATON THOMSON, vice-president, Rail Joint Co., New York, died in Atlantic City, Dec. 21, aged 57 years. Since his graduation from Princeton University in 1896, he had been identified with railroad engineering, devoting most of his time since 1906 to track problems.

Railroad Equipment

Reading Buys 2000 Cars; Inquiries Delayed

EXPECTED inquiries for railroad equipment have failed to materialize in the past week. Several roads are at the point of asking for bids on an aggregate of about 20,000 to 25,000 cars, but these prospects may not formally develop until January. The year's orders have totaled about 100,000 cars, the largest number purchased in one year since 1924. Details of the week's business follow:

Reading Railroad has awarded 2000 50-ton box cars, 600 each to the American Car & Foundry Co. and Bethlehem Steel Co. and 400 each to Pressed Steel Car Co. and the Standard Steel Car Co.

Southern Pacific will buy 10 baggage, five lounge and five dining cars.

Reinforcing Steel

Reinforcing Steel Awards

TACOMA, WASH., 450 tons, grain elevator, to Pacific Coast Steel Co.

TACOMA, 325 tons, power house for Lake Cushman project, to Pacific Coast Steel Co. and the United States Steel Products Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

PHILADELPHIA, 600 tons, Henry Avenue bridge; bids open Dec. 27.

PHILADELPHIA, 750 tons, Eighth Street subway; bids open Dec. 30.

CHICAGO, 360 tons, apartment building.

URBANA, ILL., tonnage being estimated, chemistry building for University of Illinois.

SACRAMENTO, CAL., 159 tons, highway work, San Mateo County; bids Jan. 8.

SACRAMENTO, 121 tons, highway work, Santa Clara County; bids Jan. 8.

LOS ANGELES, 104 tons for city; Los Angeles Iron & Steel Co., low bidder.

FLORENCE, ARIZ., 119 tons, cell house; bids opened.

Sheet Production and Sales Off in November

Sharp curtailment in the automotive industry is indicated by a reduction in sales of sheets by independent mills, during November, of approximately 50 per cent as compared with October, a reduction of 33 per cent in production and of about 30 per cent in ship-

ments, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers.

Unfilled orders on Dec. 1 declined over 80,000 tons as compared with Nov. 1. Unshipped orders increased slightly.

Production in November decreased to a point slightly below shipments. Sales during the month were 134,391 tons, compared with 258,810 tons during October. Production dropped to 204,071 tons, compared with 319,660 tons during the previous month. November shipments were 207,200 tons, against 291,135 tons during October. The November report and comparisons in net tons follow:

	Nov.	Oct.	Sept.
Total number of mills.	708	712	715
Capacity per month...	461,800	498,300	459,075
Percentage reporting...	67.1	67.3	67.4
Sales	134,391	258,810	274,568
Production	204,071	319,660	302,490
Shipments	207,200	291,135	301,330
Unfilled orders.....	395,696	478,038	522,803
Unshipped orders.....	107,056	106,216	111,042
Unsold stocks.....	71,680	63,174	43,886

Percentages of Capacity

	Nov.	Oct.	Sept.
Sales	43.3	77.2	88.7
Production	65.8	95.3	97.7
Shipments	66.8	86.8	97.4
Unfilled orders.....	127.6	142.6	168.9
Unshipped orders.....	34.5	31.7	35.9
Unsold stocks.....	23.1	18.8	14.2

Commodity Prices Lowest in Two Years

Commodity prices in November are reported by the United States Bureau of Labor Statistics at 94.4, compared with 96.3 in October and with 96.7 a year ago. The November level is the lowest since July, 1927. The figures are based on the average of 1926 as 100 and cover prices on 550 items analyzed monthly by the bureau.

Of the ten major groups of commodities all showed declines from October with the exception of fuel and lighting and house-furnishing goods. Many of the drops were 2 or more points. Metals and metal products went from 103.6 to 102.3, but remained higher than the 101.7 of a year ago.

Of the components of this group the iron and steel factor, non-ferrous metals and automobiles showed declines, while agricultural implements and other metal products remained at the October level. Under building materials, structural steel showed no change.

Fabricated Steel—Structural and Plate

	November, 1929	October, 1929	November, 1928
Fabricated structural steel, orders, (a) net tons, computed.....	227,150	350,350	242,550
do., do., eleven months.....	3,534,300		3,041,500
do., shipments	284,900	358,050 (b)	273,350
do., do., eleven months.....	3,318,700 (c)		2,845,150
Fabricated steel plate, orders, total (d) net tons.....	41,287	32,099	54,418
do., do., eleven months.....	487,323		492,369
do., oil-storage tanks.....	9,033	8,786	32,381
do., refinery materials, etc.....	2,523	3,316	7,509
do., tank cars.....	13,362 (e)	2,393	1,153
do., gas holders	1,857	985	2,081
do., blast furnaces.....	1,019	853	563
do., stacks and miscellaneous...	13,493	15,766	10,731

(a) United States Department of Commerce; figures are from 233 identical firms. (b) High record. (c) Exceeds 12 months, 1928 (3,126,200 tons). (d) United States Department of Commerce. (e) Largest figure in several years.

Machinery Markets and News of the Works

Tool Market Is Quiet

Sales in December Are Less in Volume Than Same Month Last Year

MACHINE tool bookings have receded further in the past week and in some cases December sales are somewhat less than in the corresponding month of 1928.

While the dullness is partly accounted for by the usual lull in buying at the Christmas season and the year-end inventory period, the hesitancy on the part of users to close for much equipment until the industrial outlook is better clarified is also an important factor.

In the New York district purchases have been confined chiefly to a few companies whose expansion programs have not been affected by the stock market debacle. In at least one in-

stance contracts were placed for about \$50,000 worth of tools.

Although builders do not expect much business from the automobile industry for some time, a fair amount of buying is expected from automobile parts makers. Farm machinery manufacturers are reported to be preparing programs for the ordering of new tool equipment. The Allis-Chalmers Mfg. Co. and the A. O. Smith Corporation, Milwaukee, also may be in the market soon.

The absence of many cancellations of orders indicates the relative stability of the market. One line of shapers has been advanced 10 per cent.

New York

NEW YORK, Dec. 23.—Some machine tool dealers in this district have had fairly good orders in the past week, though the bulk of the buying has come from a few sources. Wide distribution of buying which prevailed during a greater part of the year is not at present in evidence. December business, on the whole, has held up to a better volume than was expected. A few local offices whose December sales are low report that prospects for January are encouraging. Considerable business is pending that will not be released until after Jan. 1. The week's orders, one of which totaled nearly \$50,000, were from substantial companies whose expansion programs have not been affected by the recent stock market collapse.

Board of Water Supply, Municipal Building, New York, has plans for pumping plant on Avenue Z, Brooklyn, to cost \$100,000 with machinery. G. J. Gillespie is president.

Board of Education, Delmar, N. Y., is considering installation of manual training equipment in new junior high school to cost \$250,000 for which plans will be drawn by Pember & Dembers, 126 Washington Avenue, Albany, N. Y., architects.

Consolidated Gas Co., 4 Irving Place, New York, is arranging an expansion and improvement program to cost \$100,000,000, of which about \$75,000,000 will be used for power plants, substations and other

structures, including lines for electric division, and \$25,000,000 for gas generating and distributing division.

Murcott & Campbell, 298 Union Avenue, Brooklyn, manufacturer of files, rasps, etc., has plans for new two-story plant, 120 x 125 ft., to cost about \$65,000 with equipment. Tillon & Tillon, 415 Lexington Avenue, are architects.

I. M. Upperco, president of Upperco Cadillac Corporation, 70 Columbus Avenue, New York, representative for Cadillac automobile, and associates have organized Upperco-Burnell Aircraft Corporation, with capital of 1,000,000 shares of stock, no par value, and plans operation of plant for production of 12-passenger trimotored transport planes, including parts manufacture and assembling. Vincent J. Burnell, aeronautical engineer, will be an official of new company.

Armstrong Electric & Mfg. Corporation, 25 West Broadway, New York, is disposing of a bond issue of \$300,000, part of fund to be used for expansion in production.

Tomkins Brothers, Inc., 74 Passaic Street, Newark, building materials, has asked bids on general contract for one-story storage and distributing plant at Yonkers, N. Y., to cost about \$60,000 with mechanical handling equipment, etc. Robert Bolton, 45 Branford Place, Newark, is architect.

Atlas Portland Cement Co., 25 Broadway, New York, has 1000 acre tract near Rochester, Minn., and is considering new mill at that location, to cost more than

\$1,400,000 with equipment. A power house and machine shop will be included.

General Cable Corporation, 420 Lexington Avenue, New York, has purchased plant and business of Peerless Insulated Wire & Cable Co., Pennington, N. J., and will consolidate with its Standard Underground Cable Co. division, with main plant at Perth Amboy, N. J. Acquired plant will be continued as branch works. Company has expansion program under way at Perth Amboy, including additional manufacturing units. Part of works at Pittsburgh will be removed to this location.

United Die & Tool Works, 10 Johnson Street, Newark, has leased part of four-story factory at 158-60 Summit Street and will remove to new location early in January.

J. Strum & Co., 65 Commercial Street, Newark, manufacturers of commercial automobile bodies and wagons, parts, etc., have purchased former plant of H. F. Sommer & Co., 225 Wilson Avenue, for new works and will remove to new location and increase facilities.

Gilby Wire Co., 122 Riverside Avenue, Newark, has completed a two-story addition and will install equipment for production of fine wires, including wire mesh manufacturing division, to cost more than \$40,000.

Art Wire & Stamping Co., manufacturer of wire specialties, recently moved from 449 Central Avenue, Newark, to 119 Colt Street, Irvington, N. J. Company also does metal stamping.

Reed-Prentice Corporation, Worcester, Mass., machine tool manufacturer, has moved its New York sales office to 41 Broad Street.

New England

BOSTON, Dec. 23.—Machine tool dealers are receiving some good inquiries for one and two-tool lots, and the outlook for business early next year is more encouraging. Inquiries include large lathes, boring machines, radial drills, and at least one large planer. Current activity is confined to an occasional small tool on which comparatively early delivery can be made. The used tool market is quiet.

Reid Brothers, Beverly, Mass., have started work on a one-story machine shop, 60 x 200 ft., to cost \$20,000 without equipment.

Norwood Press Co., Norwood, Mass., will soon ask bids on a one-story foundry addition, 26 x 62 ft., and other extensions.

New Bedford Gas & Edison Light Co., New Bedford, Mass., contemplates building a power plant addition early next year. A crane is under consideration.

Standard Mailing Machine Co., Everett, Mass., has started work on an addition, 65 x 80 ft.

Hartford Empire Co., Hartford, Conn., has plans for a one-story steel storage plant, 40 & 100 ft., for which conveying equipment will be required.

In connection with an expansion program, New York, New Haven & Hartford Railroad Co., New Haven, Conn., is arranging fund of \$1,000,000, for new steam-operated electric power plant for shop service, and extensions in steam-heating facilities at repair shops.

United States Bobbin & Shuttle Co., Lawrence, Mass., manufacturer of textile mill equipment, will concentrate production at local plant in future and will discontinue operations at branch works at Lowell, Mass. Machinery from last noted plant will be removed to Lawrence.

Church Mfg. Co., Holyoke, Mass., manufacturer of sanitary ware, has begun work on an addition, to cost about \$50,000 with equipment.

Chicago

CHICAGO, Dec. 23.—Both sales and inquiries continue to taper as buyers defer machine tool programs until after the first of the year. Some dealers find December the duller twelfth month in two years, while others report it only moderately under December, 1928. The contrast between the closing month of 1928 and this year lies in the fact that sales in the past few months have been gradually tapering, whereas the opposite was the condition in the closing months of 1928. The absence of cancellations indicates the relative stability of the market. Prices tend upward with the announcement this week of a 10 per cent advance on one line of shapers.

The Caterpillar Tractor Co., Peoria, Ill., may buy some tools before the new year starts. Inquiries from other farm machinery manufacturers are promising. Allis-Chalmers Mfg. Co., and A. O. Smith Corporation, both of Milwaukee, have well shaped programs. Local dealers show no concern over the outlook for the early part of the next year.

Tips Tool Co., Taylorville, Ill., has placed a general contract for a foundry building, 25 x 40 ft.

Harry W. Leighton Co., Chicago, Ill., has recently been incorporated as representative in Illinois, Indiana, Michigan, Wisconsin and Iowa for Cleveland Steel Tool Co., Cleveland; Buckeye Portable Tool Co., Dayton Pneumatic Tool Co., Precision Gauge & Tool Co., all of Dayton, Ohio, and Schauer Machine Co., Cincinnati. Harry W. Leighton is president and treasurer; William E. Thurber, for a number of years manufacturers' representative in Chicago territory for Colonial Tool & Steel Co., is vice-president and secretary.

American Boiler & Tank Co., Chicago, has purchased property south of Clearing Industrial District for future development.

Garden City Plating & Mfg. Co., 1430 South Talman Avenue, Chicago, has leased space in adjoining building, totaling 23,000 sq. ft., for expansion.

Illinois Power & Light Corporation, 231 South La Salle Street, Chicago, is disposing of a bond issue of \$5,000,000, part of proceeds to be used for expansion and improvements in power plants and transmission lines.

Board of Education, Iowa State Bank Building, Burlington, Iowa, has plans for a two-story and basement vocational school, to cost about \$45,000 with equipment. W. F. Weibley, Tama Building, is

The Crane Market

NO new inquiries of consequence have appeared in the past week for either electric overhead cranes or locomotive cranes. Of the pending business, sellers expect but little to be placed before the end of the year. The Standard Oil Co. of New York has purchased a 15-ton, 37-ft. 9-in. span hand power crane for Ingleside, Tex., and has been taking bids on a 5-ton electric crane for Baytown, Tex. In the locomotive crane field, the Boston & Albany Railroad, has closed on a 20-ton locomotive crane.

Among recent purchases are:

S. S. Hepworth Co., New York, two 2-ton, 1-motor, underhung cranes for a new plant in Long Island City from H. D. Conkey & Co., through Florandin Equipment Co.

Walling Transportation Lines, Tottenville, S. I., New York, 5-ton, 3-motor, underhung crane from H. D. Conkey & Co., through Florandin Equipment Co.

Boston & Albany Railroad, Albany, N. Y., 20-ton locomotive crane with bucket, reported from Ohio Locomotive Crane Co.

architect. William B. Ittner, 911 Locust Street, St. Louis, is consulting architect.

Raymer Hardware Co., 58 East Fifth Street, St. Paul, Minn., has leased one-story building to be erected on University Avenue for establishment of a storage and distributing plant, to cost \$40,000. Lang, Raugland & Lewis, 1953 University Avenue, are architects.

Southern Colorado Power Co., Colorado Building, Pueblo, Colo., plans extensions and improvements in power plants at Pueblo, Canon City and Skaguay, to cost \$150,000 with equipment. Engineering department of company is in charge.

Western Electric Co., Hawthorne, Ill., has awarded general contract to H. K. Ferguson Co., Cleveland, for automobile service and garage building at works, 137 x 176 ft., for company cars, motor trucks and trailers, to cost about \$100,000. Present garage unit will be converted for manufacturing.

Board of Education, City Hall, Minneapolis, has plans for an equipment, repair and supply shop, with metal, woodworking and other departments, to cost \$250,000 with equipment. Bureau of Buildings, Division of Design and Inspection, 245 Ninth Avenue North, is in charge.

Atchison, Topeka Santa Fe Railway Co., 80 East Jackson Boulevard, Chicago, has begun work on new engine house at Fort Madison, Iowa, with one-story locomotive service and repair shop, 30 x 170 ft., for which general contract recently was let to A. W. Smith & Son, Fort Madison, to cost about \$100,000 with equipment.

Lourie Mfg. Co., 565 Washington Boulevard, Chicago, plans a large expansion program in 1930, not only in plant equipment but in manufacture of new lines. Present products include hydraulic machinery, high-speed and heavy-duty presses and high-pressure pumps. O. C. Keckley, president, who purchased a controlling interest in company in 1928, reports that 1929 business showed an increase of 100 per cent over that of preceding year, and that a large volume of unfilled orders will be carried over into new year.

Blackhawk Machine & Foundry Co., Davenport, Iowa, has recently completed an extension costing \$50,000 which provides 18,000 additional sq. ft. of floor space. Company specializes in gray iron and aluminum castings and maintains an experimental laboratory.

Milwaukee

MILWAUKEE, Dec. 23.—The holiday season has accentuated the relatively quiet tone of the machine tool market, but a general improvement is looked for after the first week in January. Inquiry the past week has been in fair volume. With the two holidays coming in midweek, production schedules are interrupted to an extent hardly warranted by orders on hand and delivery specifications.

Walter E. Lippmann, 432 Herman Street, Milwaukee, has organized Lippmann Engineering Works to manufacture sand and gravel washing machinery, coal and ash handling plants and similar special machinery. A site has been purchased in West Milwaukee, and contracts have been placed for a one-story plant, 90 x 200 ft., costing about \$65,000 with equipment. Inquiry is being made for a 5 to 10-ton traveling crane, and after Jan. 1 on other machinery.

Milwaukee Stamping Co., 300 Sixty-fourth Avenue, West Allis, Milwaukee, manufacturer of automobile and builders' hardware, finished stamping specialties and dies, has taken over Litterer Brothers Mfg. Co., 3022-3032 North Rockwell Street, Chicago, and is consolidating operation in Milwaukee works. Litterer company's main product is metal partitions. While no new construction will be done at Milwaukee for present, additions to equipment of this department will be made. Chicago plant will be retained as a storage and shipping warehouse and a branch office. Ben A. Otten is secretary of Milwaukee company.

J. F. Devine Pattern Mfg. Co., 5911 Greenfield Avenue, West Allis, Milwaukee, manufacturer of wood and metal patterns, templates, etc., is building a one-story addition, 45 x 100 ft.

Gray iron foundry of the McNally-Tollefson Co., Stoughton, Wis., operated for two years as a division of Liberty Foundry Co., Inc., Sixty-sixth and State Streets, Milwaukee, with a branch plant at Waukesha, Wis., has reverted to McNally-Tollefson interests and henceforth will operate in conjunction with Stoughton Co., Stoughton. This company is transferring its gray iron work to McNally-Tollefson shop, and is now concentrating on non-ferrous casting. Gray iron shop specializes in cylinder blocks, pistons and other internal combustion engine castings. J. E. McNally is general manager.

Butler Bin Co., Waukesha, Wis., manufacturer of steel bins and gravity loading devices for sand and gravel pits, concrete contractors, etc., will enlarge its plant at a cost of about \$40,000 early in 1930. Detailed plans are in formation.

Jacobsen Mfg. Co., Eighth Street and Washington Avenue, Racine, Wis., manufacturer of power driven lawn mowers, is erecting a two-story addition costing about \$40,000, to be used largely for office purposes and experimental shop. Company recently completed alterations of a four-story shop building acquired from Murray Body Corporation, with 93,000 sq. ft. Some additional equipment for this shop is being purchased from time to time.

Buffalo

BUFFALO, Dec. 23.—Sikes-Cutler Desk Corporation, 20 Churchill Street, Buffalo, has filed plans for a one-story addition to cost about \$35,000.

Niagara Falls Power Co., Niagara Falls, N. Y., operated by Buffalo, Niagara & Eastern Power Corporation, Electric Building, is planning construction of steam-operated electric power plant near station of Buffalo General Electric Co., an affiliated organization, to cost over \$500,000 with equipment.

Meyer-Smith, Inc., Buffalo, has been organized with capital of \$500,000, to take over and consolidate Smith Supply & Equipment Co., Inc., 50 Broadway, and A. F. Meyer & Son, 408 Broadway, manufacturers of refrigerators, meat market equipment and fixtures soda fountain apparatus, etc. New company will concentrate production at last noted location, and will operate storage and distributing plant at 294-98 Pratt Street; increased output will be arranged. Edward J. Meyer is president, and George M. Wiedmer, vice-president and treasurer.

Alfred C. and J. Victor Coty, 260 Flower Avenue East, Watertown, N. Y., have organized Coty Machine Co., with capital of \$200,000, and plan early operation of general machine works for production of finished iron and steel products. T. Earl Coty, 211 Arlington Street, will be an official of new company.

LaFrance-Republic Sales Corporation, Elmira, N. Y., manufacturer of motor trucks, with main plants at Alma, Mich., and Bloomfield, N. J., has leased building at Frelinghuysen Avenue and Hunter Street, Newark, N. J., for new factory branch, service and garage building.

Weber Machine Corporation, Rochester, N. Y., manufacturer of Syncrodisk talking picture devices, has acquired additional space of 15,000 sq. ft. in Likly Building on Lyell Avenue, for assembly and shipment of Syncrodisk turntables. Company will also soon commence production and marketing of a "sound on film" device.

International Business Machines Corporation has approved plans for an addition to its factory at Endicott, N. Y., to cost about \$700,000.

Philadelphia

PHILADELPHIA, Dec. 23.—Monarch Mfg. Works, Inc., Salmon Street, Philadelphia, general machinist, has awarded general contract to A. Earl Barnes Co., 2044 East Clementine Street, for one-story machine shop addition, to cost about \$20,000 with equipment.

Barrett Co., Thirty-sixth Street and Grays Ferry Avenue, Philadelphia, manufacturer of roofing products, etc., is planning to rebuild plant unit recently destroyed by fire, with loss reported over \$400,000 including equipment.

Springfield Metallic Casket Co., Springfield, Ohio, has leased building at 1411-17 Spring Garden Street, Philadelphia, for new factory branch, storage and distributing plant.

American Ice Co., City Center Building, Philadelphia, is arranging for expansion to cost \$1,500,000, including erection of three electrically-operated ice-manufacturing plants at East Boston, Mass., for Boston Ice Co., a subsidiary, and on East Sixtieth Street and East River, New York, for Knickerbocker Ice Co., another subsidiary; work on last noted has begun.

C. F. Simonin's Sons, Inc., Tioga and Belgrade Streets, Philadelphia, manufac-

turer of vegetable oils, etc., is planning to rebuild part of plant destroyed by fire Dec. 16; with estimated loss of \$100,000 with equipment.

McCloskey Varnish Co., Thirtieth and Locust Streets, Philadelphia, has plans for a two-story factory, on site 150 x 600 ft., at Holmesburg Junction, to cost about \$150,000 with equipment, and will remove to new location and increase capacity.

Shell Eastern Petroleum Products Co., 122 East Forty-second Street, New York, is concluding arrangements for purchase of property near Trenton, N. J., as site for oil storage and distributing plant, to cost over \$80,000 with equipment.

Board of Trustees, Hill School, Pottstown, Pa., will take bids in about 60 days for new power plant, to cost about \$40,000 with equipment. C. Z. Klauder, 1429 Walnut Street, Philadelphia, is architect.

Philadelphia Range Boiler & Steel Tank Co., Philadelphia, has been organized with capital of \$50,000 to take over and expand company of same name, with plant at 2656 Salmon Street.

School Board, Hellertown, Pa., is considering installation of manual training equipment in new two-story junior high school, to cost about \$135,000, for which plans will be drawn by Jacoby & Everett, Commonwealth Building, Allentown, Pa., architects.

Relly-Whiteman Co., Canal Bank, Conshohocken, Pa., manufacturer of oils, greases, etc., is planning new two-story plant at Spring Mill, Pa., to cost about \$70,000 with equipment.

Board of Trustees, University of Delaware, Newark, plans addition to steam power plant to cost \$75,000. Appropriation has been authorized.

Pittsburgh

PITTSBURGH, Dec. 23.—Machinery business has been very quiet in the last few days and practically no activity is expected this week. A fair volume of inquiry is in the hands of dealers, but no action is expected on this before next month and practically no new work is coming out now. The first quarter list of the Westinghouse Electric & Mfg. Co. is expected in a few days, but local dealers have no intimation as yet regarding its size. Reports from railroads in the Pittsburgh district are encouraging and dealers look for inquiry from this source early in the year.

Heavy machinery and equipment builders in this district will enter 1930 with the best order books in several years and with the prospect of continued activity. No action has been taken on a number of steel mill expansion programs announced in the last few weeks and orders for machinery on these jobs will likely be placed in the first quarter. Prominent among the projects definitely assured are the \$7,000,000 program of the Weirton Steel Co., Weirton, W. Va., the new sheet mill to be erected at Tarentum by the Tarentum Steel Corporation, an extensive program to be undertaken by the American Steel & Wire Co. at Donora, Pa., and extensions and improvements at the Etna, Pa., works of Spang, Chalfant & Co., Inc.

Dravo Contracting Co., Neville Island, Pittsburgh, operating a plant for construction of barges, tugs, etc., is planning extensions in marine ways and will provide additional shop facilities.

Westinghouse Electric & Mfg. Co., East Pittsburgh, is arranging an expansion

and improvement program to cost \$10,000,000, including plants in this vicinity and branch factories in different parts of country. Early in January company will begin commercial production of new electric refrigerator, including parts and assembling. Work has begun on eleven-story electrical and mechanical laboratory, 80 x 225 ft., at Pittsburgh, to cost \$1,500,000 with equipment.

Segal Lock & Hardware Co., 155 Leonard Street, New York, with Lenox Tile Co., 114 East 124th Street, same city, and Charles H. DeVoe, formerly head of Old Bridge Enameled Brick & Tile Co., Old Bridge, N. J., have acquired plant and business of Kenilworth Tile Co., Newell, W. Va. New owners will reorganize company and plan expansion.

Duquesne Light Co., 435 Sixth Avenue, Pittsburgh, is arranging an expansion program to cost about \$700,000, including additional generating facilities, power substations and transmission lines.

Monongahela County School Board, Morgantown, W. Va., plans installation of manual training equipment in new high school on West Virginia University Campus, for Cass, Grant and Union Districts, to cost \$300,000. Davis, Dunlap & Barney, 1805 Walnut Street, Philadelphia, are architects.

Technical Products Co., Pittsburgh, maker of acid-proof cements, is occupying a new factory at 2308 Main Street.

South Atlantic

BALTIMORE, Dec. 23.—Kitchen Cabinet Corporation, Baltimore, headed by F. X. Ganter, president of F. X. Ganter Co., Sharp and Ostend Streets, manufacturer of show cases, etc., has plans for extensions and improvements in factory at Hillsdale, to cost over \$35,000. William Ganter and Associates, 210 East Lexington Street, are architects.

Appalachian Electric Power Co., Roanoke, Va., is arranging an expansion program to cost about \$500,000, including addition to steam-operated electric generating plant at Glen Lyn, W. Va., extensions in other power stations, substations and transmission lines at Bluefield, Welch, W. Va., and vicinity.

Aeronautical Retarding Gear, Inc., 507 East Franklin Street, Richmond, Va., recently organized by R. T. Lipscombe, industrial engineer, and associates, has purchased 40-acre tract near city limits, part of site to be used for establishment of new plant to manufacture mechanical devices and equipment for aircraft; an aircraft assembling plant is also planned, entire project to cost more than \$50,000 with equipment.

American Oil Co., American Building, Baltimore, has plans for new storage and distributing plant at Greensburg, Pa., to cost about \$60,000 with equipment. T. J. O'Connell is company engineer.

Davison Chemical Co., Garrett Building, Baltimore, is arranging an expansion program for Southern Phosphate Corporation, Bartow, Fla., a subsidiary, for development of phosphate rock properties in Polk County, Fla., and opening of similar deposit near Bartow, entire program to cost over \$400,000 with conveying machinery, loading equipment, mechanical conveyors, etc. Davison company will also complete construction of new fertilizer plant now under way at Houston, Tex., to represent an investment of \$1,000,000.

Vidalia Coca Cola Bottling Co., Vidalia, Ga., has plans for new one-story bottling

plant, to cost about \$55,000 with conveying, elevating and other mechanical equipment. Pringle & Smith, Norris Building, Atlanta, Ga., are architects.

Shenandoah River Power Co., Harrisonburg, Va., will begin work in 60 or 90 days on new hydroelectric generating plant on Shenandoah River, to cost over \$300,000 with transmission line. L. E. Long is general superintendent.

Board of Education, Baltimore, plans installation of industrial art and manual training department in new school at Brehm's Lane and Chesterfield Avenue, to cost about \$300,000 for which superstructure will soon be placed under way. McKenzie & Cross, Professional Building, are architects.

City Council, Danville, Va., has plans for additional hangars and mechanical shops at municipal airport, to be occupied under lease by Lynchburg Flying Service, Inc., Lynchburg, Va., to cost more than \$45,000 with equipment.

Shell Eastern Petroleum Products Co., 122 East Forty-second Street, New York, is said to be arranging for purchase of oil storage and distributing plant of Mecklenburg Oil Co., Charlotte, N. C., and plans extensions and installation of additional equipment.

New construction costing \$16,000,000 is planned for 1930 by Georgia Power Co., and affiliated companies, Columbus Electric & Power Co., and South Georgia Power Co. This will be largest amount spent by company in any single year of its history. A steam plant in Atkinson, near Atlanta, and a hydroelectric plant at Furman Shoals, near Milledgeville, are chief among 1930 construction plans.

Detroit

DETROIT, Dec. 23.—Kelsey Wheel Co., 3600 Military Avenue, Detroit, manufacturer of steel automobile wheels, has plans for a one and two-story addition, 300 x 800 ft., to cost more than \$450,000 with machinery. Albert Kahn, Inc., Marquette Building, is architect and engineer.

Ziv Steel & Wire Co., 2945 West Harrison Street, Chicago, has plans for new branch plant at Meyers Road and Union Belt Railroad, Detroit.

Lansing Steel Corporation, Lansing, Mich., has plans for a one-story unit for structural steel fabrication and ornamental iron work, to cost about \$30,000 with equipment.

Detroit Aircraft Corporation, Union Trust Building, Detroit, has purchased plant and business of Gilders, Inc., Orion, Mich., manufacturer of airplane equipment and will consolidate. Orion plant will be removed to main works at Detroit where production will be concentrated.

Hill Diesel Engine Co., Lansing, manufacturer of Diesel engine units, parts, etc., has arranged for increase in capital from \$125,000 to \$1,000,000, part of fund to be used for general expansion.

Accuralite Co., Muskegon, Mich., manufacturer of pistons, automobile engine parts, etc., is considering one-story addition to cost more than \$30,000 with equipment.

Hospital Commission, Dearborn, plans power plant and mechanical laundry at new institutional building, entire project to cost \$1,000,000. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

Scott Engineering Co. Lindbergh Field, Kalamazoo, Mich., aircraft equipment, has awarded general contract to O. F. Miller,

Kalamazoo, for one-story plant unit, to cost about \$25,000.

Timken-Detroit Axle Co., West Fort Street, Detroit, has plans for a two-story addition, 100 x 100 ft., to cost more than \$85,000 with equipment.

Indiana

INDIANAPOLIS, Dec. 23.—Connorsville Blower Co., Connorsville, manufacturer of rotary blowers, rotary pumps, gas boosters, etc., is considering one-story addition to cost over \$35,000 with equipment.

Standard Oil Co. of Indiana, Inc., 910 South Michigan Avenue, Chicago, has approved plans for one-story addition, 50 x 150 ft., to refinery at Whiting, Ind., for acid concentrating plant, to cost about \$60,000 with machinery.

Electric Steel Castings Co., Speedway City, Indianapolis, will begin superstructure for a one-story addition, 54 x 200 ft., to cost about \$50,000 with equipment, general contract recently let to Hetherington & Berner, 701 Kentucky Avenue.

Apex Stamping Co., Crawfordsville, manufacturer of metal stampings, is considering one-story plant at Elmore Street, to cost about \$30,000 with equipment.

Municipal Airport Department, City Hall, Indianapolis, Paul Moore, superintendent, will soon begin erection of hangars, with repair facilities and administration building at municipal airport, National Road, Ben Davis, about seven miles from city, to cost about \$100,000 with equipment. McGuire & Shook, 941 North Meridian Street, are architects.

Buhner Fertilizer Co., Jeffersonville Avenue, Seymour, will erect one-story plant, 60 x 250 ft., to cost about \$40,000 with equipment.

Cleveland

CLEVELAND, Dec. 23.—Machine tool sales and inquiry fell off the past week. However, several single tool orders were placed. The quieting down that usually occurs during the holiday season is in evidence and not much activity is looked for during the remainder of the month. Outlook for the early part of January appears promising as a number of inquiries are pending for fair sized lots of tools. While machinery manufacturers do not look for much business from motor car builders for some time, a fair amount of buying is expected from some of the parts manufacturers.

Accural Metal Products Co., Terminal Tower Building, Cleveland, has plans by Ernest McGeorge, 3030 Euclid Avenue, architect and engineer, for a one-story plant, 95 x 200 ft., to cost about \$50,000 with equipment.

Tuscan Tire & Rubber Co., Carrollton, Ohio, is considering call for bids early in January for rebuilding part of plant recently destroyed by fire, new unit to be one-story, 40 x 180 ft.

Board of Education, Shady Side, Ohio, is considering installation of manual training equipment in new high and grade school, to cost about \$175,000. J. E. Lewis, 205 Cleveland Avenue, N. W., Canton, Ohio, is architect.

Ohio Injector Co., Wadsworth, Ohio, is contemplating one-story addition to steam specialty manufacturing plant, to cost more than \$50,000 with equipment.

Lewis Machine Co., Cleveland, has moved from 6303 Central Avenue to 1600 East Twenty-fourth Street.

St. Louis

ST. LOUIS, Dec. 23.—Union Electric Light & Power Co., Twelfth and Locust Streets, St. Louis, has plans for one-story equipment storage and distributing plant, 160 x 300 ft., including garage, service and repair unit, to cost over \$120,000 with equipment. Beaume & Klein, American Trust Building are architects.

Home Convenience Mfg. Co., 1423 Illinois Avenue, Kansas City, Mo., recently formed by Philip D. Morelock of Shouse, Doolittle & Morelock, Land Bank Building, and associates, plans early operation of local factory for production of metal domestic specialties, including hand-operated washing machines and parts, bread-slicing devices, etc. E. B. Jones, inventor, will be identified with company.

Empire Gas & Fuel Co., Bartlesville, Okla., has begun construction of aviation field on 400-acre tract and plans hangar, with repair and reconditioning facilities, and other mechanical field units, to cost more than \$65,000 with equipment.

Metal-Air Corporation, Oklahoma City, Okla., is considering construction of one-story aircraft manufacturing plant, including parts and assembling departments, to cost over \$80,000 with equipment.

City Commission, Morrilton, Ark., will soon take bids for municipal steam-operated electric power plant, to cost about \$100,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Wheat Farming Co., Hays, Kan., Fred Beeby, head, plans construction of grain elevator, including conveying, elevating and screening equipment, with one-story machine shop on adjoining site, 40 x 75 ft., entire project to cost over \$60,000.

Carter-Waters Co., 2049 Main Street, Kansas City, Mo., road-building materials and supplies, will soon take bids on general contract for a four-story storage and distributing plant, 75 x 100 ft., to cost over \$100,000 with equipment. Archer & Gloyd, Pioneer Building, are architects.

Missouri & North Arkansas Railroad Co., Harrison, Ark., will proceed with superstructure for engine house, 75 x 100 ft., with shop facilities at Kennett, Ark., to cost about \$70,000 with equipment. H. J. Armstrong is chief engineer.

Reeves & Skinner Machinery Co., St. Louis, has been appointed by American Fluid Motors Co., Philadelphia, as its sales representative for Hele-Shaw pumps in Missouri and southern Illinois.

The St. Louis-San Francisco Railway Co., St. Louis, B. T. Wood, vice-president and chief purchasing officer, is taking bids until Jan. 10 on the following equipment:

One 100-in. 600-ton wheel press with a 15 hp. Allis-Chalmers motor.

One 9-in. motor-driven bench type lathe, similar to South Bend model.

One 3/16-in. power ring and circular shears, similar to Peck, Stow & Wilcox No. 537.

Three radius link grinding machine, similar to H. G. Hammet's.

One bending brake, similar to Dries & Krump No. 207, with 10-hp. motor.

Two railroad internal grinders, similar to Micro model F, G., with 5-hp. motor.

One portable locomotive crank pin grinder, similar to Micro model GG.

One 8 x 30 in. single surfer, similar to Yates American type B-8.

One tilting metal band saw, similar to Klemm No. 1.

One vacuum portable sander, similar to Clarke sander.

One portable electric crane, similar to Elwell-Parker type CK.

One 10-ton electric hoist, similar to American Engineering Co.'s Lo-Hed type.

Two 7½ kva. single-phase transformers. One motor generator set.

Two 300-amp. d.c. welding machines.

Two 3-unit filters, similar to Reed type SCF.

Two 2-unit filters, similar to Reed type SCF.

Two type A washing tanks.

Two type C charging tanks.

Two 15-gal. drums adhesive.

Three driving wheel press recording gages, similar to Ashton No. 46.

Four piston paters, similar to Smith No. 6.

One 3-ton 20-ft. lift pneumatic-gear hoist.

Removal of its sales office and service station from 6400 Plymouth Avenue, to 1935 Indiana Avenue, is announced by Wagner Electric Corporation of St. Louis.

Cincinnati

CINCINNATI, Dec. 23.—Conservative buying on the part of machine tool users continues. Fresh bookings slackened a trifle further the past week, although manufacturers reported a number of pending orders. Planers and heavier tools appear in better demand than lathes. Inquiry, also, is reflecting the reluctance of buyers to enter the market, requests for quotations being fewer than a month ago.

A Michigan manufacturer purchased two 18-in. engine lathes from a local builder and a company in the East bought one 16-in. lathe from the same maker.

Cincinnati Steel Castings Co., Spring Grove and Alabama Streets, Cincinnati, has awarded general contract to D. Melniken & Son, 2143 Bernard Avenue, for one-story foundry addition, 90 x 295 ft., to cost over \$100,000 with equipment.

Indian Refining Co., Lawrenceville, Ill., has plans for addition to oil storage and distributing plant at Dayton, Ohio, to cost about \$40,000 with equipment.

Mead Pulp & Paper Co., Chillicothe, Ohio, has awarded general contract to Westerman Construction Co., 247 East Broad Street, Columbus, Ohio, for two and three-story addition, to cost more than \$75,000 with equipment. Company also plans other expansion.

Clarksville Aviation Corporation, Clarksville, Tenn., has approved plans for hangar unit at local airport, including repair and reconditioning facilities, to cost about \$35,000. Walter G. Koch is engineer.

City Council, Johnson City, Tenn., plans extensions and improvements in municipal waterworks and system, to cost about \$400,000 including pumping machinery, power and other mechanical equipment.

Geyer & Neuffer, Ludlow Arcade Building, Cincinnati, architects, have awarded general contract to A. P. Ziegler, Inc., Lowe Building, for one-story L-shaped automobile service, repair and garage building, 84 x 428 ft., to cost about \$100,000 with equipment.

Officials of Eagle-Picher Lead Co., 1006 Broadway, Cincinnati, are organizing new subsidiary, Eagle-Picher Mining & Smelting Co., to take over and expand properties in Missouri and Oklahoma. New company will also acquire property and business of Consolidated Lead & Mining Co., St. Louis, as well as several other smaller producing companies, and will consolidate with organization.

Ford Motor Co., 660 Lincoln Avenue, Cincinnati, has awarded general contract to Weber-Bell Construction Co., Townsend Avenue, for extensions and improvements in local assembling and distributing plant, to cost about \$40,000.

Gulf States

BIRMINGHAM, Dec. 23.—Maverick County Water Improvement District No. 1, Eagle Pass, Tex., has awarded general contract to Ulen & Co., 120 Broadway, New York, for a hydroelectric power plant on Rio Grande River, about 35 miles from Eagle Pass, and irrigation system, to cost \$6,000,000, generating station to represent about \$1,000,000 of expenditure.

National Lead Co., International Life Building, St. Louis, will lease two-story building at Dallas, Tex., for establishment of new branch plant.

Beaumont Coca-Cola Bottling Co., 795 Main Street, Beaumont, Tex., operated by Coca-Cola Co., Atlanta, Ga., is planning one-story bottling works, 200 x 425 ft., with elevating and conveying equipment, automatic bottling machinery, etc., to cost about \$140,000. Company engineers, Atlanta, are in charge.

Waggoner Pipe Line Co., Wichita Falls, Tex., is planning construction of pipe line from oilfields in Wilbarger County to North Wichita Falls, to cost more than \$100,000 with booster station equipment, etc.

Kelly Axe & Tool Co., Charleston, W. Va., is planning erection of branch plant at Sheffield, Ala., to cost about \$25,000 with equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has taken bids on general contract for two-story and basement factory branch and distributing plant, 90 x 250 ft., at San Antonio, Tex., to cost about \$100,000 with equipment. Company engineering department is in charge.

Board of Education, Corsicana, Tex., is considering installation of manual training equipment in new junior high school, to cost about \$160,000. Blanding & Horn, Corsicana, are architects.

Austin Bridge Co., Dallas, Tex., manufacturer of road machinery, structural steel products, etc., will soon begin construction of new plant at West Dallas, to cost about \$275,000 with equipment.

C. J. Tagliabue Mfg. Co., Brooklyn, maker of oil testing instruments, on Jan. 1 will open a branch factory at Shreveport, La., for emergency orders and repair work. C. L. Huffman will be district manager.

Canada

TORONTO, Dec. 23.—While demand for machine tools has fallen off, partly due to the holiday season, local builders and dealers are of the opinion that business will be resumed on a more active scale early in the new year. Announce-

ments of new plant construction are being made which indicate that equipment requirements will be large before next spring.

Packard Electric Co., Ltd., St. Catharines, Ont., will start work next year on erection of a motor plant on St. Paul Street West. Architect has not yet been appointed.

Coffield Washer Co., 80 Niagara Street North, Hamilton, Ont., has awarded contracts for a three-story addition to cost \$100,000. Frid Construction Co., has general contract.

Maryin Hewitt Container Co., Ltd., has let contract to Thomas P. Ephgrave, 310 London Street, for an addition to cost \$50,000. Herbert Martin, 8 Lytton Boulevard, Toronto, is interested.

Canadian Office & School Furniture Co., 195 King Street, Preston, Ont., has awarded contract to Oscar Wiles, Kitchener, Ont., for an addition to cost \$50,000.

C. E. Cansfield Electric Co., 260 Geary Avenue, Toronto, has awarded contract to J. D. Young & Apperley, 423 Ossington Avenue, for a plant addition to cost \$10,000.

Neptune Meter Co., 345 Sorauren Avenue, Toronto, has awarded a number of contracts for a plant addition.

Dominion Car Wheel & Foundry Co., Calgary, Alta., has purchased 13-acre site and will start work early next year on erection of a new plant.

Pacific Coast

SAN FRANCISCO, Dec. 19.—Schlage Lock Co., 20 Bayshore Avenue, San Francisco, manufacturer of locks, hardware, etc., has filed plans for one-story additions to increase present floor space one-third, to cost about \$90,000 with equipment. New unit will be used primarily for production of heavy-duty locks.

Alco Oil Tool Co., Avalon Boulevard, Compton, Cal., manufacturer of oil drilling equipment, etc., has awarded general contract to A. R. Eaton, 526 Burton Avenue, Los Angeles, for one-story addition, 60 x 350 ft., to cost about \$60,000 with equipment.

Pacific Lighting Corporation, Los Angeles, operating Los Angeles Gas & Electric Co., Southern California Gas Corporation, and other light and power utilities, is disposing of a preferred stock issue to total \$2,000,000, part of proceeds to be used for expansion.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, has begun work on group of one-story equipment storage, service and repair buildings, to cost \$275,000 with equipment. Architectural department of company, address noted, in charge.

Pine Creek Lead-Zinc Mining Co., Wallace, Idaho, has begun foundations for a new flotation mill, to cost more than \$275,000 with machinery.

McGoldrick Lumber Co., Spokane, Wash., has plans for extensions and improvements to cost about \$100,000 with equipment.

Oregon Machinery Co., Eugene, Ore., has awarded general contract to J. R. Ford, Eugene, for one-story storage and equipment plant, to cost more than \$30,000 with machinery.

Idaho Power Co., Boise, Idaho, plans expansion and improvement program to

cost \$1,000,000, including additional generating facilities, power substations, transmission lines and other work.

Utah Industrial Alcohol Co., Salt Lake City, Utah, will build four-story plant, 50 x 100 ft., at Springville, Utah, to cost \$75,000 with equipment.

Foreign

PLANS are being completed by Backus-Brooks Co., Builders' Exchange, Minneapolis, Minn., operating paper and lumber mills in United States and Canada, for new plant in Finland to manufacture insulating board, similar to that manufactured by Minnesota & Ontario Paper Co., a subsidiary. Proposed mill will consist of several units and is reported to cost more than \$500,000 with machinery.

Soviet Russian Government, Moscow, has plans for an iron and steel works, and auxiliary division for manufacture of farm tractors, at Kharkof, to cost over \$100,000,000 with equipment. Tractor plant will be developed to capacity of 500,000 machines per annum. Work on projects will begin in spring. Amtorg Trading Corporation, 262 Fifth Avenue, New York, is official purchasing agency for Soviet Russian Government.

Rhine-Westphalia Electric Power Corporation, Berlin, Germany, has arranged for increase in capital from 181,000,000 m. (about \$45,200,000) to 243,000,000 m. (about \$60,740,000), part of proceeds to be used for expansion and improvements in power plants and system.

Electrolytic Zinc Co., Sydney, Australia, is arranging an expansion and betterment program at mining properties in Broken Hill district, including extensions to Risdon plant, to cost more than \$400,000. Company has also begun construction of new mill near Rosebery, Tasmania.

A branch office has been established at Johannesburg, South Africa, by Sullivan Machinery Co., Chicago, maker of Sullivan Diamond Core Drills. Charles C. Smith, formerly one of Sullivan company agents in South Africa, will be manager of new office.

New Trade Publications

Seamless Forged Steel Cylinders and Casing Couplings.—Harrisburg, Pa. Pipe Bending Co., Harrisburg, Pa. Booklet of 38 pages giving data on the steel seamless cylinders for high-pressure gases, seamless couplings for oil well tubing, coils and bends, pump liners, and bull plugs. Also carbon and alloy steel billets, slabs, bars, plastering channels and angles, drop forgings and hollow forgings. Control of all processes within the plant, from the making of the ingot to the finished product, is a feature stressed in the booklet.

Automatic Lathes.—Jones & Lamson Machine Co., Springfield, Vt. Booklet describing the 24-in. Fay automatic lathe, which is built in two types, one for chuck work and the other for work on centers. It is larger and more powerful than the standard Fay, and the increased size permits additional facilities for mounting tools and attachments, making it possible to finish more complicated pieces at one setting. Illustrations show the lathes tooled for machining large railway roller bearings, first and second operation, pipe flanges and large gears.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

MANUFACTURING activity in November was 95.4, according to the *Annalist* index, as compared to 103.5 for October (and 108.8 at the May peak), the biggest month-to-month drop since the war. Factory employment decreased 3.1 per cent and payrolls 6.8 per cent; some large cities are reporting distress among unemployed.

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ELECTRICAL machinery, machine tool manufacturing, coal mining, shipbuilding, paper, boot and shoe and tobacco industries equal or slightly exceed activities in corresponding week of 1928.

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AUTOMOBILE production, in the cheap grades, is expanding slightly. *Automotive Industries* forecasts that 10 per cent fewer cars will be made in 1930 than in 1929. Since the dealers seem to be hardest hit by the recent slump in sales, a sharp reduction in future trade-in values is expected. . . . Ford announces that new models will carry old prices, but Chrysler has posted a \$20 to \$100 advance. . . . European car manufacturers launch a "Buy a home-made automobile" campaign. . . . After four years of compulsory liability insurance, Massachusetts finds that automobile casualties have increased 25 per cent; three-quarters of the accidents are due to careless drivers.

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RETAIL trade has been hampered by severe weather. . . . Philadelphia, Atlanta and the Coast districts report very satisfactory trade, employment and numbers of new projects; elsewhere conditions are not so favorable. . . . Retail jewelers, furriers and radio showrooms report that sales have rebounded from the bad slump experienced in November.

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CARPET and rug exhibits for spring carry prices about 4 per cent over the levels of a year ago. . . . Whittall Associates, a leading carpet manufacturer, will spend \$1,000,000 for a new power plant and weaving mill in Worcester, Mass.

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COMMODITY index continues its downward trend. . . . Wheat prices fluctuated violently. Operators profess to fear unusually large carryover of last year's grain. . . . Grain dealers have protested that the Federal Farm Board's control of national marketing cooperatives has put the government into business and will put them out.

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INCOME taxes due in 1930 from individuals and corporations will be scaled down one per cent in pursuance to law signed by President Hoover.

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TOBACCO growers in Kentucky are offered \$22 for their leaf, and remembering the \$31 received last year, are declining to sell except for urgent needs. . . . Union Tobacco Co. finds it

cannot manufacture and sell several brands of cigarettes at enough profit to pay the required royalties, and votes to cancel contracts with American Tobacco Co. and retire from trading field. . . . Tobacco and canned fish are the leading items of export to the Far East. Australasia also takes large numbers of automobiles and other machinery. Total exports to that region in 1929 were 10 per cent higher than in 1928.

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FRANCE will repay its war debt of four billion dollars in 62 years, according to the agreement ratified by the Senate. . . . United States, Great Britain, Japan, Netherlands and some smaller States sign a trade treaty, negotiated by the League of Nations, to abolish all mutual embargoes, quotas and other trade restraints except tariffs. . . . France has raised import duties on canned fruits (mostly American) from 75 to 170 per cent, depending upon the sugar content. . . . Western Electric Co. is to equip a \$10,000,000 "talkie" studio in France, to operate under Hollywood direction.

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ARENTINE exports of wheat and meat have declined so greatly that the trade balance has been cut to half that of last year. Local business is bad, as evidenced by slow collections and many insolvencies. The Government also has discontinued redeeming paper money for gold. This immediately reduced the dollar value of the peso, which in turn is expected to reduce imports and stimulate exports.

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INSOLVENCIES of importance include Combustion Engineering Corporation, a \$43,000,000 holding company, whose assets consist of the stocks of subsidiaries, which being unlisted are not readily marketable. . . . American Piano Co. also found itself in need of ready cash, since its assets are largely instalment payments due (on the average) many months hence. . . . Harry British properties, including Steel Industries of Great Britain, which became insolvent several weeks ago, involve \$67,500,000 unsecured claims, mostly held by large banks and industrial companies.

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RAIL consolidation into 21 systems is proposed by the Interstate Commerce Commission. . . . That body also decides it cannot revise rates to Philadelphia, Baltimore and the Gulf ports, in such a way as to divert central Western freight to them rather than to the port of New York. . . . Railway passenger traffic is now only 75 per cent of the 1911 to 1913 average, 30,000,000 day coach travelers having been diverted yearly to buses. . . . To compete with highway traffic, the Pennsylvania Railroad has purchased 150 high speed electric locomotives to operate between New York and Philadelphia, capable of running 90 to 100 miles per hour, and cutting the present time by 20 per cent.

